

Edition # 7 A

\$19.95

Radio / Tech Modifications & Alignment Controls

This Edition contains everything available
including information contained in all previous
Editions

Modifications for:

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7 A

ICOM
Kenwood
Scanners

See back cover for specific radios

Este manual foi doado por PY2WFG Wilson
para ser scaneado e disponibilizado
GRATUITAMENTE a toda a comunidade

Scaneado em cores, 300 DPI (é o maximo que minha maquina faz,
nao me batam) em uma copiadora Lexmark X864de, imagens
tratadas com o programa IRFANVIEW e pdf gerado com o Adobe
Acrobat XI Pro, usando Clearscan

Eu scaneio, trato e disponibilizo manuais gratuitamente meramente
pelo prazer de faze-lo. Caso voce queira ajudar com manuais,
insumos e ate mesmo uma merrequinha pra ajudar na conta de luz
e na manutenção da maquina, entre em contato pelo email
alexandre.tabajara@gmail.com (tambem é pix)

Obrigado a todos que ajudaram ate aqui

Os sites onde esses scans podem ser encontrados:

- www.bama.org
- <http://tabajara-labs.blogspot.com>
- <http://tabalabs.com.br/esquemateca>
- <https://datassette.org/>

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COMO NO MANUAL. O OBJETIVO DE MANTE-LAS É VOCE
PODER IMPRIMIR UM MANUAL IDENTICO AO ORIGINAL.
NAO ESTÁ FALTANDO PAGINA NENHUMA NO MANUAL

Distribuição **GRATUITA**. Respeite o meu trabalho.
São Paulo, Agosto de 2021

7A

Radio / Tech Modifications

Edition 7
Part A

artsci

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P.O. Box 1428
Burbank, CA 91507
(818) 843-4080
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Radio / Tech Modifications

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Printed in the United States of America

IC-T21A
VHF FM
Transceiver



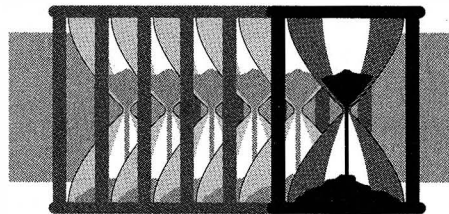
IC-T41A
UHF FM
Transceiver

Feel The Comfort Of Extended Operations With The IC-T21A!

Full Crossband Duplex Operation

Dual Band Receive Capability – Permits reception of another band (i.e.: 440 MHz on the IC-T21A).

Full Crossband Duplex Operation – Possible with the unique "whisper mode" microphone (standard) for telephone type QSO's.



6 Hours Operating Time*

Low Power Consumption – Consumes only 8 mA while standing by.

Auto Power Control – Conserves the battery by monitoring the repeater signal strength and selecting the best matching output power from 5 levels (down to 15 mW).

Auto Low Power Function – Automatically selects 15 mW just before battery exhaustion so you can complete your QSO.

* 5.5 to 6 hours with 1:1.8 duty cycle (Tx high : Rx : Standby)

Battery Capacity Indicator – Shows battery capacity.

New Scanning Standards

Ultra High Speed Scan – 3 to 4 times faster than most other handhelds (33 channels/sec., 12.5 memory ch./sec.).

Bonus Band – Can be scanned while the main band is being scanned (e.g.: 70 cm for the IC-T21A).

Backlit Keypad!
With 4 selectable levels of contrast!

6 Priority Watch Modes – Check for other signals while operating on a VFO frequency.

Ultra-Convenient Repeater Operations

Subaudible Tone Scan – Detects, displays *and programs* the tone frequency into the VFO. Permits access to a repeater when you don't know the tone frequency.

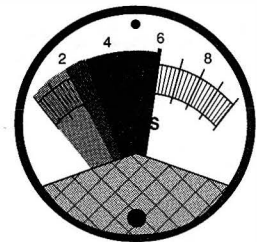
Auto Repeater Function – Automatically activates repeater settings (duplex ON/OFF, duplex direction, tone encoder ON/OFF) when the operating frequency falls in the repeater output range.

Repeater Memory – Quickly recall settings of your last worked repeater (RPT-M key).

5 DTMF Memories – Automatically dial your favorite telephone numbers.

Selectable DTMF Transmission Speed –

Adjust the IC-T21A/T41A to the capabilities of the repeater (5 cps, 2.5 cps, 1.6 cps, 1 cps).



Powerful 6 W Output Power*

Our newly designed SC-1257 power module provides all the power necessary to reach fringe areas. Accepts 4-16 V input.

* With a 13.5 V DC power source.

Innovative Memory Functions

114 Memory Channels – Store *all* repeater information.

Memory Select Channels – For quick access, up to 30 can be designated Memory Select Channels.

Memory Transfer – Quickly transfers a memory channel's contents to VFO. Useful for searching for signals near a memory channel.

EEPROM – Memory information is retained virtually forever.

And More!

- Includes Flexible Antenna, Belt Clip, Handstrap, Rechargeable Ni-Cd Battery Pack and Charger
- Built-in Pager, Code Squelch, Pocket Beep & Tone Squelch

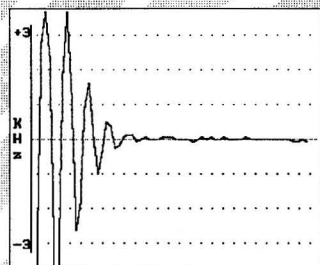
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ICOM®

Call our Brochure Hotline for FREE literature
on ICOM radios: (206) 450-6088.

MoTron ELECTRONICS

310 Garfield St Suite 4
PO Box 2748
Eugene, Oregon 97402



This is an actual FingerPrint captured by the TxID-1

TxID-1 Transmitter FingerPrinting System

Now Shipping!

FM/AM radio transmitters have a unique frequency versus time start-up characteristic—even radios of the same make and model. This "FingerPrint" can be captured, stored and analyzed. Our exclusive TxID Software and the patented technology of the TxID-1 IBM/ Compatible circuit board can help you identify the abusers on your repeater! Or help you keep track of the number of radios per account on commercial repeaters. CTCSS, DCS and DTMF decoding, as well as Deviation measurements and Spectrum Occupancy features further enhance the system.

TxID-1 with Software \$699.00

Shipping/Handling USA or Canada: \$8.00

Auto-Kall® AK-4 DTMF Decoder/Controller Board



The **Auto-Kall® AK-4** may be used for either Selective Calling or Remote Control applications.

- ~All-Call/Group-Call
- ~On-Board 1A Relay
- ~Five Separate Outputs
- ~Fully Assembled and Tested

The outputs can be configured for either 2 latched/2 momentary or 3 latched/1 momentary. On/off codes for latched outputs are unique, NOT toggled. The on-board relay may be used as either a timed audio or auxiliary output. A manually reset latched output turns ON when a Group-Call code is decoded.

AK-4W DTMF Decoder/Controller Board, fully assembled and tested \$99.00

XC-1 DTMF to ASCII Transceiver

The new **XC-1** is an economical bi-directional DTMF to ASCII transceiver. DTMF digits are decoded from the audio line, converted to ASCII, and transmitted out through the RS-232C port. ASCII data is received from the RS-232 port, converted to DTMF digits and transmitted on the audio line. Input, output and power connections are via a 10 position IDC connector. The **XC-1** is a fully assembled and tested printed circuit board.

XC-1 DTMF to ASCII Transceiver \$99.00

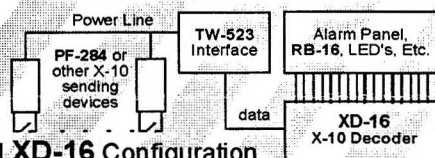
XD-16 X-10 Decoder and RB-16/1 Relay Board

The new **XD-16**, when connected to the required **TW523** power line data interface module, decodes all 256 X-10 codes sent by **PF284**, or similar, X-10 senders. The house code is DIP switch selectable. The 16 open-collector outputs are turned on or off as unit and command codes are decoded. These outputs, as well as power and ground connections are accessed via a 20 position IDC header. The **XD-16** may be used as an Alarm Panel Interface and save hundreds of dollars in cable installation costs! Or drive relays, LEDs, etc. in custom alarm or house control applications. The **XD-16** is a 3' x 3' printed circuit board assembly. Requires 9 to 18 VDC @ 25ma. (12 VDC @ 500ma recommended when powering the **RB-16/1**)

The new **RB-16/1** Relay Board is a 2.75" x 6" printed circuit board assembly. The board features 16 SPDT relays, each rated for 1 Amp operation. Control lines and power inputs are via a 20 position IDC Connector. Relay connections are made using three 16 position terminal strips. Requires 12 VDC @ 450ma.



X-10 Decoder



A Typical **XD-16** Configuration

XD-16 X-10 Decoder Board \$ 59.00
RB-16/1 Relay Board w/16 Relays @ 1A 199.00
PF284 X-10 Sender (Powerhouse) 29.00
TW523 Power Line Interface (Powerhouse) 29.00



Visa, MasterCard, American Express and Government Purchase
Orders accepted. COD on Cash or Money Order basis only.

S/H: \$5 USA/Canada (except where noted); \$15 Foreign. Premium Shipping available at additional charge

Info: (503) 687-2118 **Orders: (800) 338-9058** Fax: (503) 687-2492

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Transmitting out of band.

SURFACE MOUNT COMPONENTS..... 5

How to remove.
How to install.

MODIFICATIONS / ALIGNMENTS -

ICOM..... ICOM -1

KENWOOD..... KENWOOD-1

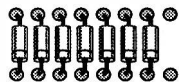
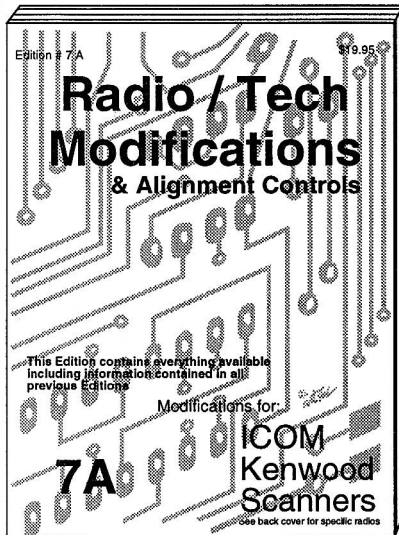
SCANNERS..... SCANNERS-1

PROOF OF PURCHASE..... LAST PAGE

Radio/Tech Modifications

EDITION 7A

- MODIFICATIONS FOR OUT OF BAND OPERATION
- ALIGNMENT CONTROLS
- OTHER ENHANCEMENTS!!!



Kenwood

TH-21A	TM-711
TH-22A	TM-721
TH-25A	TM-731
TH-26A	TM-732
TH-27A	TM-733A
TH-28A	TM-741
TH-31A/BT	TM-742
TH-41A/BT	TM-941
TH-42AT	TM-942
TH-45A	TM-2530
TH-48A	TM-2550
TH-55A	TM-2570
TH-75A	TR-751
TH-77A	TR-2500
TH-78A	TR-2600
TH-79A	TS-50
TH-215	TS-140S
TH-315	TS-430S
TM-221	TS-440S
TM-231A	TS-450S
TM-241A	TS-680
TM-251A	TS-690S
TM-321	TS-711
TM-331	TS-790A
TM-421	TS-850S
TM-431A	TS-930S
TM-441A	TS-940
TM-621	TS-950SD
TM-631	TS-2400
TM-641	TW-4100
TM-701A	TM SERIES

ICOM

IC-02AT	IC-820
IC-2A/AT	IC-900
IC-2iA	IC-901A
IC-2GAT	IC-970
IC-2GXA	IC-1200
IC-2SA	IC-2330
IC-2SAT	IC-2340
IC-2SRA	IC-2400
IC-3SAT	IC-2410
IC-04AT	IC-2500
IC-4GAT	IC-2700
IC-4SAT	IC-3200
IC-4SRA	IC-3210
IC-12AT	IC-3220
IC-12GAT	IC-2230
IC-24	IC-H16
IC-25	IC-M600
IC-27A/H	IC-M800
IC-28A/H	IC-P2AT
IC-32AT	IC-P4AT
IC-38	IC-R71
IC-48	IC-R7000
IC-228	IC-RP1220
IC-229	IC-RP1520
IC-281	IC-RP4020
IC-290	IC-RP4520
IC-448	IC-S21
IC-449	IC-S41
IC-575	IC-T21
IC-707	IC-T21
IC-720	IC-DELTA I
IC-725	IC-DELTA 100
IC-726	IC-U2AT
IC-729	IC-U4AT
IC-730	IC-U16
IC-735	IC-V21 AT
IC-736	IC-W2A
IC-737	IC-W21A
IC-740	IC-W21AT
IC-745	IC-X2A
IC-751	IC-X21AT
IC-761	IC HT'S TO TNC
IC-765	
IC-781	

Scanners

Uniden Bearcat

BC-200
BC-205
BC-700
BC-760
BC-855
BC-890
BC-950
BC-2500
MR-8100

Regency

R-4030
R-1600
R-1600

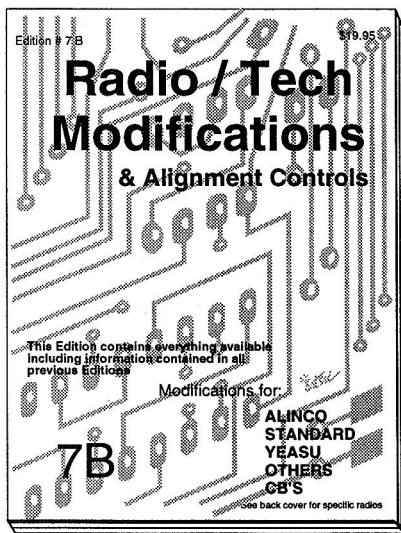
Radio Shack

PRO-23
PRO-33
PRO-34
PRO-37
PRO-39
PRO-43
PRO-46
PRO-51
PRO-2004
PRO-2005
PRO-2006
PRO-2022
PRO-2026
PRO-2027
PRO-2026
PRO-2026

artsci
artsci inc
P.O. Box 1428
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EDITION 7B

- MODIFICATIONS FOR OUT OF BAND OPERATION
- ALIGNMENT CONTROLS
- OTHER ENHANCEMENTS!!!



Alinco

ALD-24T
ALR-22T
DJ-100T
DJ-120T
DJ-160T
DJ-162T
DJ-180T
DJ-460T
DJ-500
DJ-560
DJ-580T
DJ-F1T
DJ-G1T
DR-110T
DR-112T
DR-119T
DR-130T
DR-510
DR-570T
DR-590T
DR-592T
DR-599T
DR-600T
DR-1200T
HT Packet
Mobile

Other

AZDEN
PCS-6000
PCS-7000
PCS-7500
AZ-21A
K D K
FM-240
FM-2033
TEN TEC
PARAGON
RANGER
AR-3300
AR-3500
UNIDEN
HR-2500
HR-2510
HR-2600
RADIO SHACK
HTX-100
MISC.
RCI 2950
HeathKit
H-2-Mini
H4-HT
HW-24
HW-24-HT
SB-1400
Sender/
ADI Corp
TR-450

Standard

C108A
C158A
C168A
C188A
C228A
C468A
C488A
C528A
C558A
C628A
C1208A
C5608DA
C5718A
HT TNC Hook

CB radios

Cobra	President
Realistic	Raider
Alaron	Ranger
Audiovox	RCA
Browning	RCI
Clarion	Regency
Colt	Robyn
Convoy	Royce
Courier	Sanyo
Craig	SBE
Dak	Sears
Fannon	Siltronics
Fuzzbuster	Sharp
GE	Superstar
Gemtronics	Teaberry
Hy-gain	Tenna Phase
JC Penny	Tram
Johnson	Truetone
Kraco	Uniden
Lafayette	VTAC
Midland	Vector
Mopar	Wards
Pace	Whistler
Palomar	Xtal
Panasonic	Zexon
Pearce Sim	

Yaesu

FL-7000	FT-747
FT-11R	FT-757
FT-23R	FT-767GX
FT-26	FT-811
FT-33R	FT-815
FT-411R	FT-816
FT-73R	FT-840
FT-76	FT-890
FT-209	FT-990
FT-211	FT-1000
FT-212	FT-2200
FT-227R	FT-2311
FT-290	FT-2400
FT-311	FT-2500
FT-411	FT-4700
FT-415	FT-5100
FT-416	FT-5200
FT-470	FT-6200
FT-530	FT-7400
FT-650	FT-2070
FT-709	FT-ONE
FT-711	NC-29
FT-712 RH	NC-42
FT-727	FT Series
FT-736R	All Models

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Introduction

THERE ARE 2 BOOKS IN THIS EDITION SET. AN ORDER FORM FOR THE OTHER BOOK IS AVAILABLE IN THE BACK OF THIS BOOK.

The newest versions of RADIO/TECH MODIFICATIONS is Edition 7, part A (7A) Edition 7, part B (7B). Edition 7A contains all known modifications for ICOM and Kenwood Radios and mods for the popular scanners. Edition 7B has all the modifications for Yeasu, Alinco, Standard, Azden, KDK, Ten Tec, Ranger, Uniden, Radio Shack and popular CB radios.

During the past 5 years we have created 7 Editions of Radio/Tech modifications. Each new edition included the information contained in the previous editions. So if you have the current edition, you do not need to purchase the previous ones.

We make every effort to improve the illustrations with each new edition. The modifications presented here have been performed by many people throughout the world. Unless the manufacturer changes the radio in some significant way, the modifications contained in this book are accurate and current.

We make every effort to provide all available modifications for every radio we can find. In some cases, additional information is available for a radio that can not be presented in the book. We try and keep this information on file and will provide it to verified owners of the current edition for a small fee. We also try to keep the cost of the modification books as low as possible. We ask that you do not photocopy pages from these books. We will provide support, however if you call us we will ask that you have the book in your hands at the time of the call.

It was only logical that we start to include the alignment points for each of the radios. Since you are inside them performing the modification, it is a good time to adjust the Modulation and Power levels.

If you find a new radio is not listed in these pages, contact us and ask about it. We may have a copy that did not make the printing deadline. If you purchased the book and have proof of purchase, we can make the new modification available to you.

Your comments and suggestions are always welcome. If the mod works great, let us know. If you can't make the mod work, let us know. We can't test every modification, we don't have all the radios. Your help will make the next editions better for everyone.

A word on the Radio Shack HTX-202

Once in a while we receive a modification for a radio that we are unable to test. If we receive verification that a modification works from a number of people, we will print the modification in our new edition.

We have only had one problem with this policy, the HTX-202. We received copies of a modification from three different people. One person in particular wrote us and we called him back about the mod. He swore that he had done the modification to three radios and it worked perfectly.

Very soon after publication we started to get calls from everyone who tried to perform the modification. No one could find the part specified. It turned out the parts did not exist. Apparently the modification was a hoax created by someone as a joke and published on electronic bulletin boards. (The fellow no longer answers his phone!!!)

After researching the radio, finding the original manufacturer (no its not ICOM) and reviewing the radio schematics, it has been determined that there is no modification available for the HTX-202.

We think that Radio Shack requested a radio that could not be modified from the manufacture, to protect itself from FCC problems. If you purchased one of these radios, write a letter Radio Shack and express your personal dissatisfaction. If they get enough letters and complaints they may think twice before limiting their products in the future.

Good luck and remember to use common sense before you press the Push-To-Talk button.

Modifications and the law

Cellular Phone Bands

The Federal Communications Commission (FCC) is the agency in charge of controlling the airwaves in the United States. It has been their responsibility to oversee the content of the transmissions from broadcasters in the United States.

On April 26, 1993, the FCC decided that they should not only control what information is broadcasted on the airwaves, they should also control the sale of radios capable of receiving certain frequencies.

The issue in this decision is protecting the privacy of cellular phone users. The Cellular phone frequency band in the upper 800 MHz range has become a favorite scanner listening band. The cellular users deserve their privacy. Hence, the FCC has declared a ban on all scanner style radios or converters capable of receiving the cellular band.

The wording of the new law is intended to regulate what type of receivers may be sold in the United States.

Section 15.121 Scanning receivers and frequency converters designed or marketed for use with scanning receivers.

(a) Except as provided in paragraph (b), scanning receivers, and frequency converters designed or marketed for use with scanning receivers, must be incapable of operating (tuning), or readily being altered by the user to operate, within the frequency bands allocated to the domestic Public Cellular Radio Telecommunications Service in part 22 of this chapter (cellular telephone bands). Receivers capable of "readily being altered by the user: include, but are not limited to, those for which the ability to receive transmissions in the cellular telephone bands can be added by clipping the leads of, or installing, a simple component such as a diode, resistor and/or jumper wire; replacing a plug-in semiconductor chip; or programming a semiconductor chip using special access codes or an external device, such as a personal computer. Scanning receivers, and frequency converters designed or marketed for use with scanning receivers, must also be incapable of converting digital cellular transmissions to analog voice audio.

(b) Scanning receivers, and frequency converters designed or marketed for use with scanning receivers, that are manufactured exclusively for, and marketed exclusively to, entities described in 18 U.S.C. Section 2512 (2) are not subject to the requirements of paragraph (a).

It seem apparent that the FCC is attempting to protect the cellular phone users privacy. The Cellular industry is also taking reasonable precautions to protect their users with their new digital technology. Perhaps after digital takes over, the FCC will relax or repeal the rule.

Transmitting out of band

The Federal Communications Commission (FCC) has another set of rules that controls the type of transceivers approved for use in the United States. The purpose is to make sure that transmissions are clean and do not cause interference or emissions on other frequencies.

The FCC has a special relaxed rules for Amateur equipment that help to encourage lower pricing for transceivers. The FCC will approve a radio for use only in the Amateur frequency range, but the same radio may be refused for use in the Business band.

Use of a Amateur approved radio to transmit outside the amateur band is illegal no matter what type of license you have, (MARS & CAP do have a permission to exceed the limits by 3-4 MHz).

No discussion about transmission on the Police bands is needed here. It is illegal and wrong and can cause loss of Human life. If you know of anyone doing it, turn them in.

TS-32P DIP Switch Programmable Encoder-Decoder

\$57.95

Universal design provides CTCSS capability to all FM transceivers. On-board DIP switch allows instant programming without tone elements, counters, or other test equipment. Crystal controlled for high accuracy and stability. The 32 location tone memory is complete with standard EIA tones from 67.0 to 203.5 Hz, or may be ordered with ANY 32 custom tone frequencies between 0 - 250.0 Hz (± 0.1 Hz) at no extra charge. Multiple tone switching is easily done with your radio's channel select switch or separate single pole switch. A high pass tone rejection filter is included on board to remove tone from received audio. Reverse polarity protection and RF immunity are built in. Powered by 6 - 24 vdc, unregulated at 8ma. Supplied with color-coded wires terminated to plug directly onto the TS-32P. Mounting materials include hardware and double sided, insulated tape.

TS-64 Microminiature CTCSS Encoder-Decoder

\$64.95

The latest - and smallest - programmable CTCSS encoder-decoder for use in FM transceivers. Ideal for many handheld radios and others with limited space. Select from 64 preset CTCSS tones between 33.0 Hz and 254.1 Hz using six PCB jumpers. Tone stability is crystal controlled with accuracy better than 0.05 Hz. Output level can be adjusted from 0V to 3.0V. A time-out-timer feature permits programming transmit duration to eight different intervals decreasing "stuck mic" problems. Receiver Hi-pass filter and busy channel lockout are included. Decode sensitivity is 15mv. Power can be from 6.0vdc to 20.0vdc @ 9ma. Operating temperature range is from -30°C to $+65^{\circ}\text{C}$. When P.T.T. switch is released, the TS-64 continues to key transmitter for 160ms. During this time, the TS-64 generates a reverse phase burst which will mute the decoding unit at the other end. A microminiature plug and socket with color coded wires attached is provided for hookup. Comes with double sided tape for quick mounting.

SS-32PA DIP Switch Programmable CTCSS Encoder

\$28.95

Universal design provides CTCSS encode capability to all FM transceivers. On-board DIP switch allows instant programming without tone elements, counters, or other test equipment. Crystal controlled for high accuracy and stability. The standard 32 tone memory contains the EIA tones from 67.0 to 203.5 Hz (or may be ordered with ANY 32 custom tone frequencies between 0 - 250.0 Hz at no extra charge). Multiple tone switching is easily achieved with your radio's channel select switch or a separate single pole switch.

SS-32SMP Micro-Miniature CTCSS Encoder

\$27.95

Super small programmable CTCSS encoder for use in handheld radios and other size restricted applications. Has the same basic features as the SS-32PA (see above), but does not include the on-board DIP switch due to size limitations. Programming is done by soldering binary coded jumpers on the tone board.

TE-64 Multi-purpose CTCSS/Burst Tone Encoder

\$79.95

Fully enclosed encoder provides, from a front dial rotary switch, all EIA CTCSS tones from 67.0 to 203.5 Hz PLUS all the common burst tones from 1600 to 2550 in 50 Hz increments. All available tone frequencies are permanently screened onto the faceplate, and selected with a calibrated dial. Great for test bench or service vehicle applications. Operates on 6-30 vdc, and all connections are made to a terminal strip at the rear of the unit. A 9 volt battery plug and cable is included, and may be attached at the terminal strip or soldered directly to the circuit board for field operation. Packaged in a high impact plastic case, with mounting bracket and hardware supplied.

TE-64D Multi-purpose CTCSS/Burst Tone Encoder w/Display

\$129.90

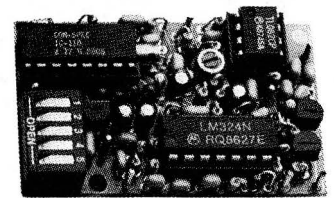
An enhanced version of the TE-64 encoder (see above). Features a two-digit LED which displays a number from 01 to 32 that in turn corresponds with the CTCSS or burst frequency selected by the front panel rotary switch. The two-digit number displayed is cross-referenced to the tone frequency on a chart located on the faceplate. Perfect for mobile applications, night-time operations, or whenever high visibility read-out is desired. Operates on 6-16 vdc (current draw does not allow operation from 9 volt battery).

NEW!

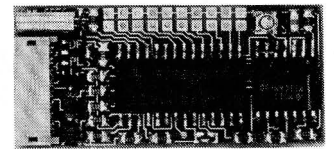
ID-8 Automatic Morse Station Identifier

\$89.95

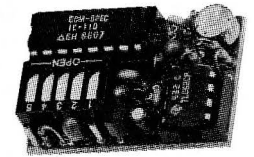
Provides automatic Morse station identification for commercial, public safety, and amateur radio applications, including repeaters, base stations, mobiles, beacons, CW memory keyers, etc. Meets all FCC identification requirements. Low voltage/current operation and small size make it universally applicable. Low distortion, low impedance, adjustable sinewave output. High accuracy crystal control. All functions are programmable with plug-on keypad, included with each unit. Programmable options include: Eight selectable messages; CW speed 1-99 seconds; interval timer 1-99 minutes; hold off timer 0-99 seconds; CW tone frequency 100-3000 Hz; front porch delay interval 0-9.9 seconds; CW or MCW; etc. All programming is stored in a non-volatile EEPROM, which may be altered at any time via the included keypad. Supplied with programming keypad, wire set with microminiature plug for easy installation or removal, both hardware and tape mounting materials, and easy to follow instructions.



Programmable Encoder-Decoder
1.25"x2.0"x0.40"



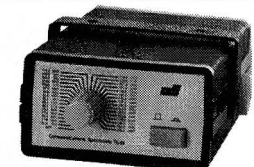
Microminiature CTCSS Encoder-Decoder
.78"x1.70"x.25"



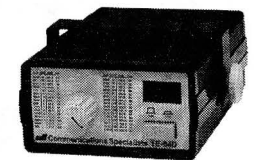
SS-32PA / SS-32PB Encoder
0.9"x1.3"x0.4"



SS-32SMP / SS-32SMP-B Encoder
0.53"x1.00"x0.16"

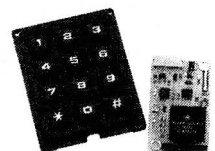


TE-64 Tone Encoder
5.25"x3.3"x1.7"



TE-64D Tone Encoder w/Display
5.25"x3.3"x1.7"

NEW!



ID-8 Automatic Morse Code Identifier
1.85"x1.12"x0.35"



STARTEK INTERNATIONAL INC. FREQUENCY COUNTERS

FIND FREQUENCIES FAST with the Startek ATH™ Series
Four **AUTO TRIGGER & HOLD** Models, **TWO Priced Below \$200!!**

NEW!
ATH-10

\$149.
\$179 value

**MADE
IN
USA**

ATH™ SERIES FEATURES:

- Easy to use - simple controls
- Ultra fast response time
- Extra **BRIGHT LED** digits
- AC or Battery operation
- Maximized sensitivity



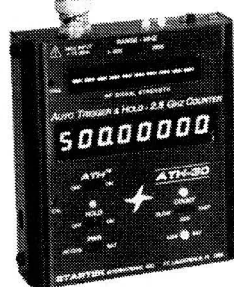
Optional #TA-90 Antenna



\$189.
\$235 value

WARRANTY
5 Years Parts
1 Year Labor

BAND PASS FILTERS



ACCESSORIES

#CC-90	Soft Case for all models.....	\$12.
#TA-90	Telescope BNC antenna.....	12.
#TA-90-L	Telescope Elbow BNC antenna.....	16.
#RD-150	150 MHZ Rubber Duck antenna.....	16.
#RD-2750	27 & 50 MHZ Rubber Duck antenna.....	28.
#RD-450	450 MHZ Rubber Duck antenna.....	16.
#RD-800	Cellular phone band RD antenna.....	29.
#C/6A ABOVE 7 items, SAVE \$30 ...99.		
#M-207-IC	Interface Cable MFJ ant. analyzers.....	10.
#P-110	200 MHZ 1X-10X probe.....	39.
#LP-22	Low Pass, Audio probe.....	25.
#DC-10	Direct, 50 OHM probe.....	20.

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Order Lines**

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Orders Only
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Model 1350

Economy Frequency Counter
1-1300 MHZ, 3 GT, Hold Sw.
(No ATH or Bar Graph)....**\$119.**

All instruments are
true Pocket Size:
4" High x 3.5" Wide x
1" Deep, <14 cubic in.
and are shipped with
factory installed
Ni-Cad batteries and
AC charger/adaptor.
Antennas are
optional.

FEATURES

	ATH-10 \$149 reg \$179	ATH-15 \$189 reg \$235	ATH-30 \$249 reg \$299	ATH-50 \$289 reg \$339
FREQUENCY RANGE	1 MHZ - 1200 MHZ	1 MHZ - 1500 MHZ	1 MHZ - 2800 MHZ	5 HZ - 2800 MHZ
AUTO TRIGGER & HOLD	YES	YES	YES	YES
SIGNAL BAR GRAPH	NO	YES	YES	YES
LOW BATTERY IND.	NO	YES	YES	YES
ONE-SHOT & RESET	NO	OPTIONAL	YES	YES
HI-Z LOW RANGE	NO	NO	NO	YES

OPTION #HST-15 is a high accuracy, high stability, time base upgrade that
can be ordered with any ATH series model (0.2PPM TCXO).....**\$100.**

Extend readability distance with **BAND PASS FILTERS. \$49 ea.**

#LP-60	DC - 60 MHZ	#BP-150	130 - 500 MHZ
#HP-400	400 - 1500 MHZ	#HP-800	800 - 2000 MHZ

#BP-4 All 4 Filters \$189

STARTEK INTERNATIONAL INC.

398 NE 38th St., Ft. Lauderdale, FL 33334

Terms: Shipping/handling charges U.S. & Canada 5% (\$5 min., \$10 max) Others add 15%. FL residents add 6% tax. COD fee \$5.
VISA, MC, Discover accepted. Prices & specifications subject to change without notice or obligation.

Surface Mount Components

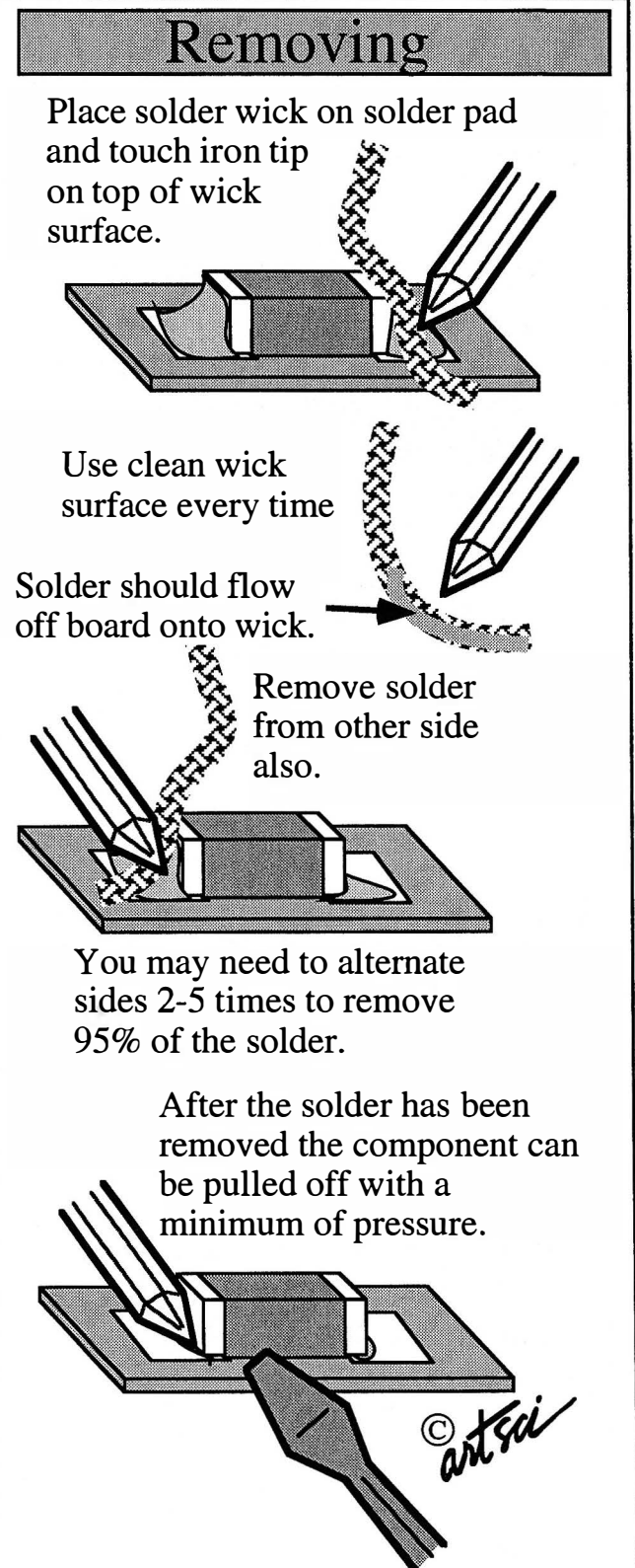
Many of the modifications presented in this text require you to remove Surface mount components.

Surface mount components come in various configurations, starting with large microprocessors all the way down to single diode packages. You will even find that single diodes and resistors come in different sizes.

Some of these modifications use very small packages with three leads. About a year ago I ordered 50 of a popular package and accidentally dropped them on the carpet, I lost 20 of them because I couldn't find them!!

You will find that with a little care and the proper tools, you will be able to remove the components.

I suggest solder wick as the best method to remove the solder, some people prefer a solder sucker. This is of course assuming that you do not have access to a desoldering station (\$3,000 plus).



Caution must be taken to protect the component (if you will need it again) and the circuit board. Damaging the circuit board is the most expensive accident you can have.

Excess heat can lift the circuit board traces right off the board. A small section might stick to the soldering iron and you might not notice until you discover the radio won't work.

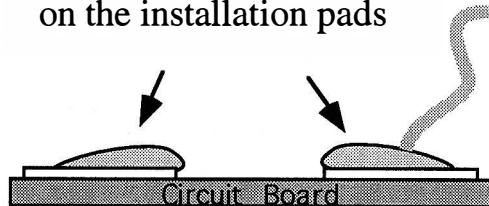
Installing components is easier than removing them. Excess heat during installation should also be avoided.

Remember to hold the component in place using a blunt tool or screwdriver. Small surface mount components seem to jump right off the board and glue themselves to a soldering iron.

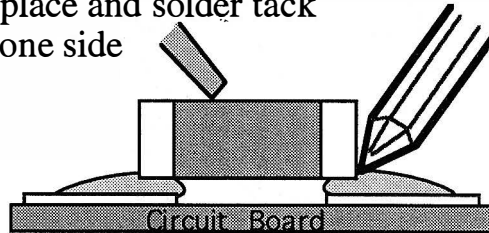
To test if a component is properly attached, use a volt/ohmmeter. Attach a lead to the trace on the circuit board and make sure that continuity is present.

Installing

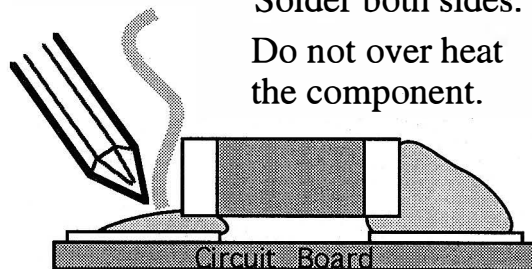
Place a small amount of solder on the installation pads



Place the component on the board
Hold the component in place and solder tack one side



Solder both sides.
Do not over heat the component.



Solder should be smooth and fully bonded to the component

- Some technicians prefer to use a solder sucker to remove solder.
- Components can be damaged by excess heat.
- Components may adhere themselves to the tip of the soldering iron if not held in place.

Radio / Tech Modifications

ICOM Radio Modifications

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Radio / Tech Modifications

ICOM Radio Modifications

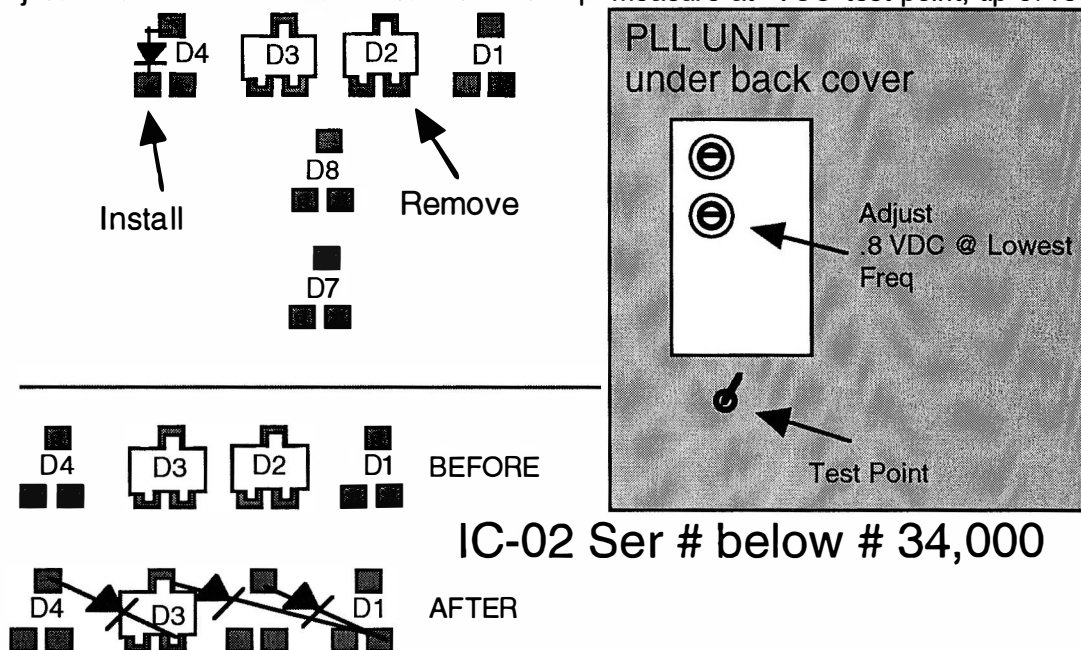
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ICOM IC-02AT

EXPANDED RF/ SCAN RATE INCREASE

1. Remove battery and antenna.
2. Remove screws open case.
3. Locate and remove chip diode D2 on Logic unit.
4. On 02's with ser # over 34,000 - Install a diode across pads of diode D4 (see drawing) 1N4148 or 1SS211
5. On serial #'s below 34,000 install three diodes. (see drawing)
6. Locate R413 on logic board, it is located below the right hand corner of the microprocessor. The letters C6 are printed above it and 13 is below it.
7. Attach (piggy-back) another 270,000 resistor on to R413. (Scan Mod)
A very small resistor is required. If you use a 1/8 watt or larger use wire rap wire to mount it out of the way.
8. Reassemble the radio.
9. Reset the microprocessor. (ser#<34000 Push button next to lithium battery, on >34000 Hold [FUNCTION] and turn power on

Note Adjust VCO for .8 v. DC at lowest desired Freq. Measure at VCO test point, tip of resistor R253.

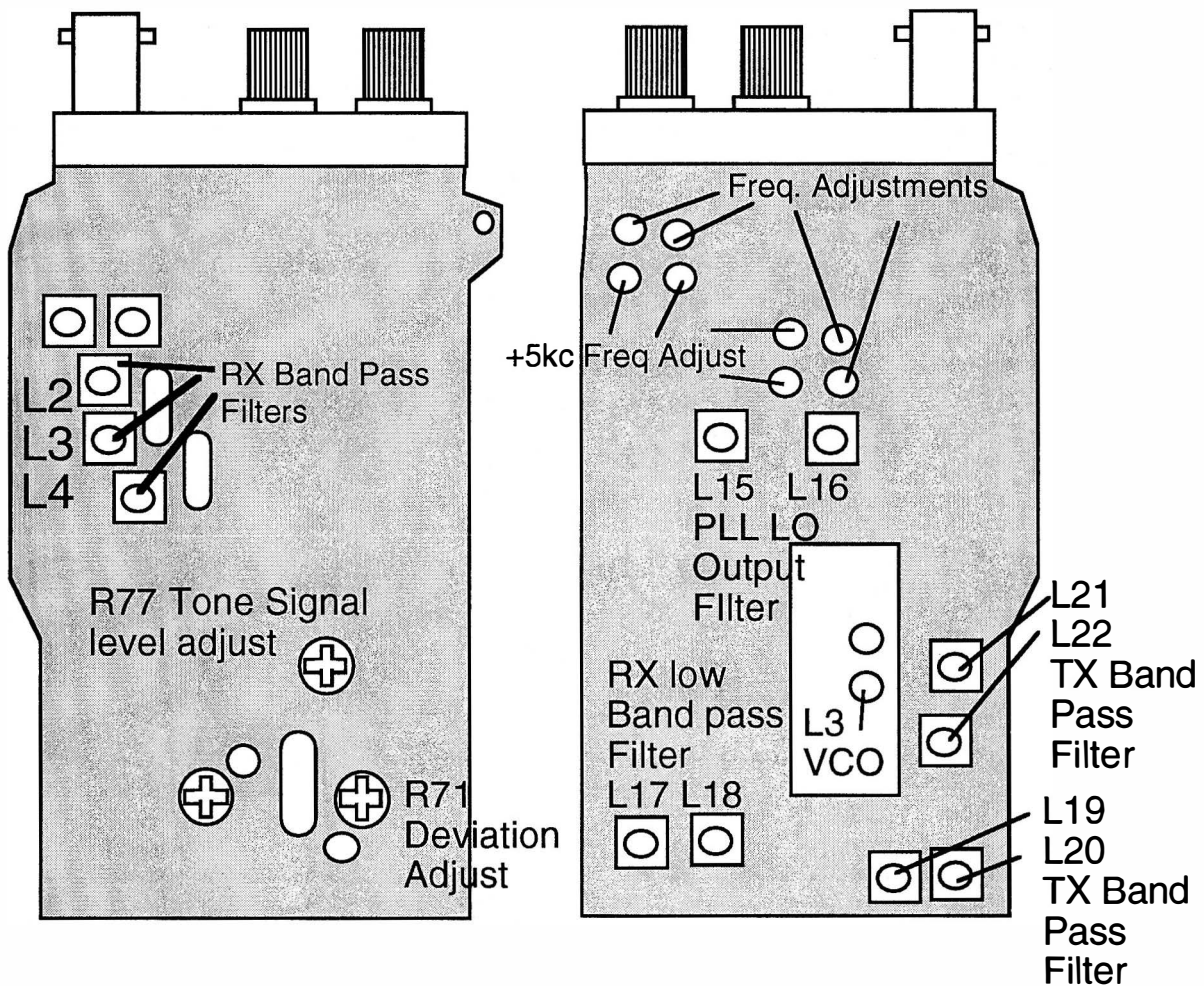


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ICOM IC-2A/AT

ALIGNMENT CONTROLS



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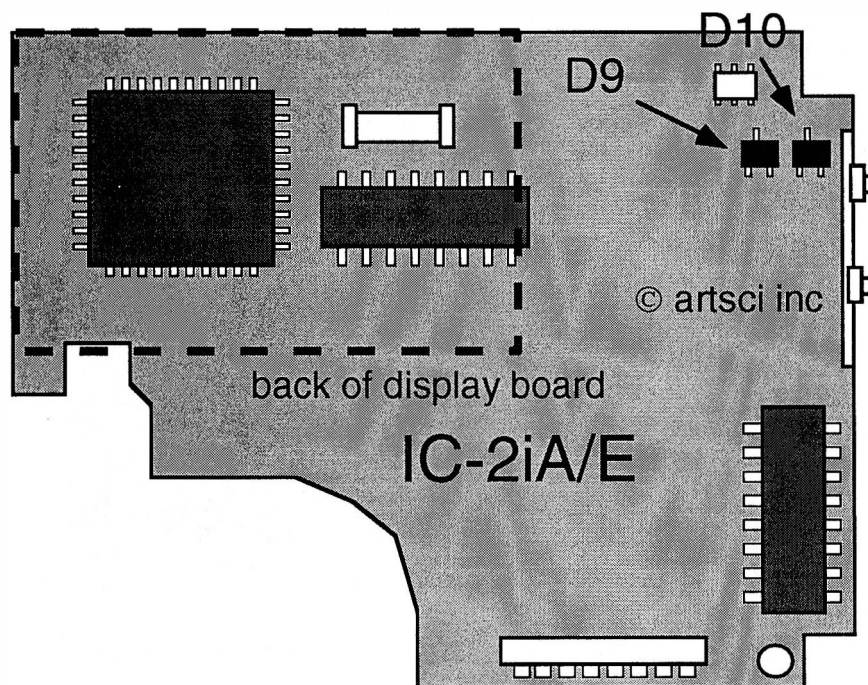
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ICOM IC-2iA/E

EXPANDED RF
118-136 MHz AM Receive
136-174 MHz TX/RX

1. Remove battery and antenna.
2. Remove screws and open radio.
3. Locate and remove chip diode D9. (Be careful, do not over heat or lift traces)
4. **Install a Chip diode in position D10.** (MA132K - ICOM part # 1790000820)
5. Reassemble the radio.
6. Reset the microprocessor, if needed (see users manual for reset instructions)



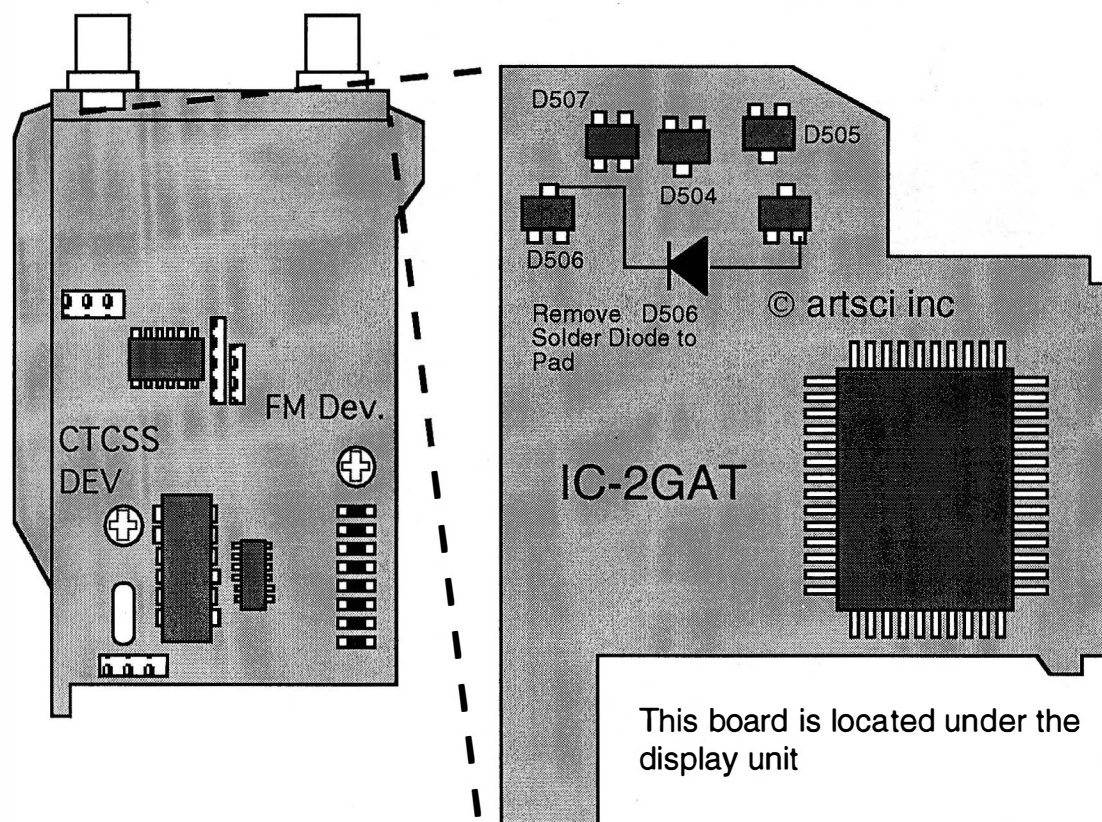
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ICOM IC-2GAT

EXPANDED RF

1. Remove battery and antenna.
2. Remove screws and open radio
3. **Remove D506** (this part is already removed on US version)
4. Attach diode as shown (Use 1N914 or equivalent Diode)
Make sure Diode leads will not short anything. Cover them in tape.
5. Reassemble the radio
6. **Reset the radio.** (Turn radio on, Hold [LIGHT] & [FUNCTION], turn radio off and back on)



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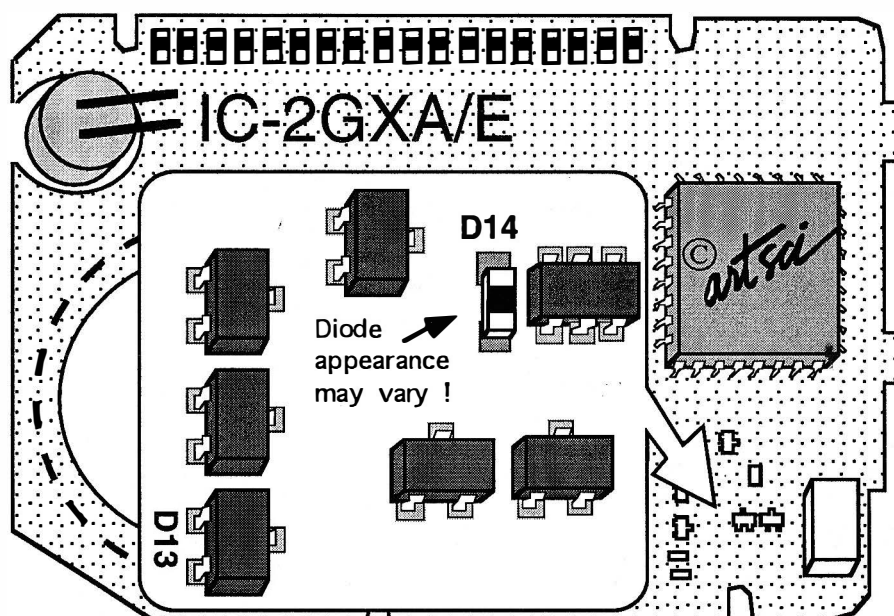
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ICOM IC-2GXAT

EXPANDED RF
136 - 180 MHz

1. Remove battery and antenna.
2. Remove screws and open radio
3. Locate Logic Unit.
4. Locate and **remove Diode D13**(RX Mod).
5. Locate and **remove Diode D14** (TX Mod).
6. Reassemble the radio
7. If required, reset the microprocessor. (see user manual)

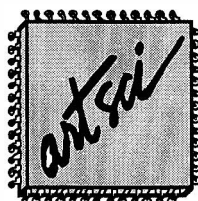


OPTIONAL KEYBOARD RX MOD -

Press and hold [FUNC] & [SCAN] & [DUP] and turn power on.

Notes:

The usable frequency range is 138 MHz to 174 MHz, but the frequency display has no limits. Reports say that the RX sensitivity is poor around 138 MHz.



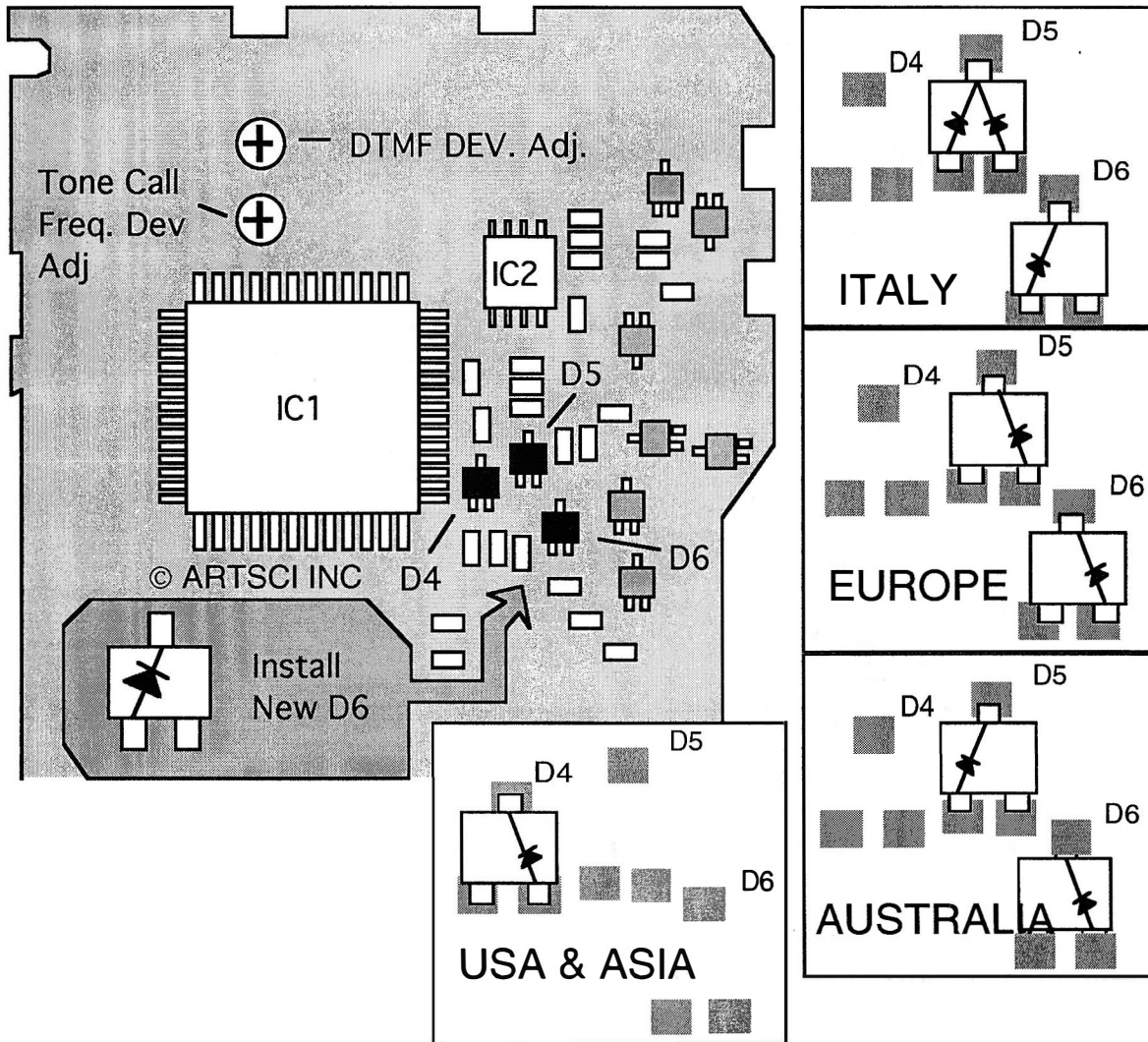
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ICOM IC-2SA, 2SAT & 3SAT

EXPANDED RF

1. Remove battery and antenna.
2. Remove screws and open radio.
3. Locate and **remove diode D9** on LOGIC A unit (Already removed on USA version)
4. **Remove chip diode D6.** (Already removed on USA version)
5. Solder **install a chip diode (DA114) in place of D6 position.**
A 1N4148 or other diode can be used if extreme caution is taken.
6. Reassemble the radio.
7. **Reset the microprocessor.** (2SAT: Press & hold [#], [B] & Light, Turn power on)



MORE ----

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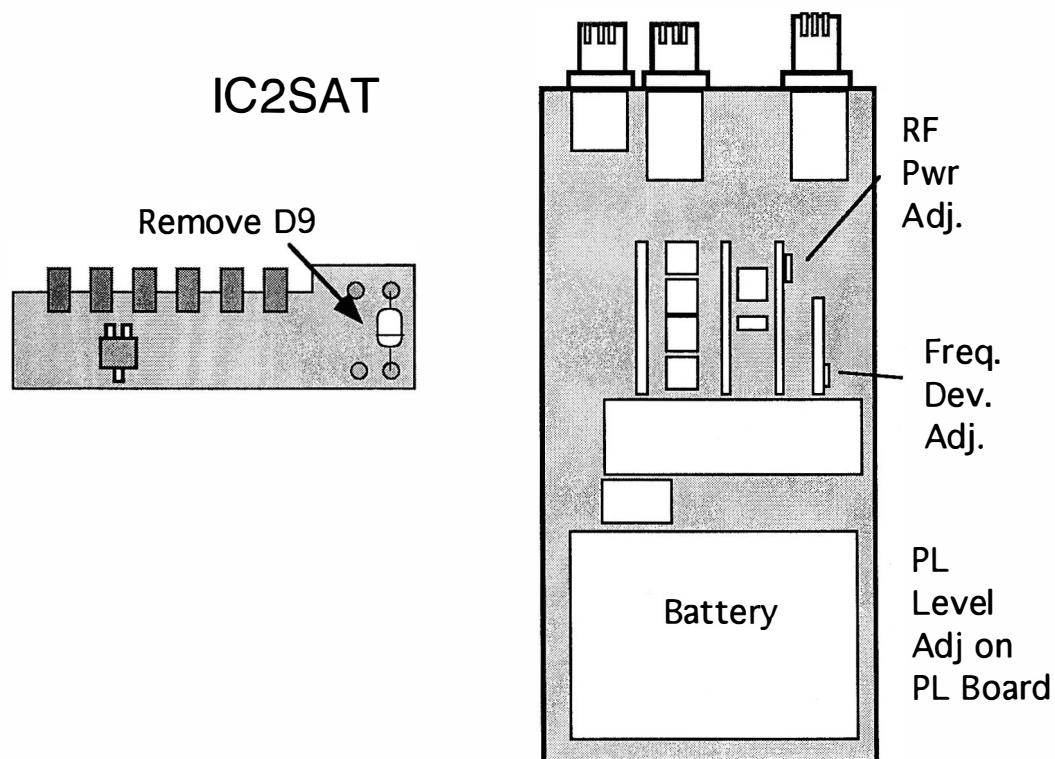


ICOM IC-2SA, 2SAT & 3SAT

ALIGNMENT POINTS

2SAT Range RX 108-140 AM, 138-169 FM, 310-370 FM TX 139 - 163 FM

Optional Commands: Push [LAMP] & [Keyboard Key, see below] and Power on.
 [1] Enter 4 digits, [2] Enter 5 digits, [3] Enter 6 digits,
 [4] Pause Scan, [5] to see timer scan, [7] PS off
 [8] PS 1:4 125 msec on/500msec off, [9] PS 1:16
 [0] PTT Disable, [*] PTT Enable, [#] PTT Disable
 [A] Reset, [D] Display Test



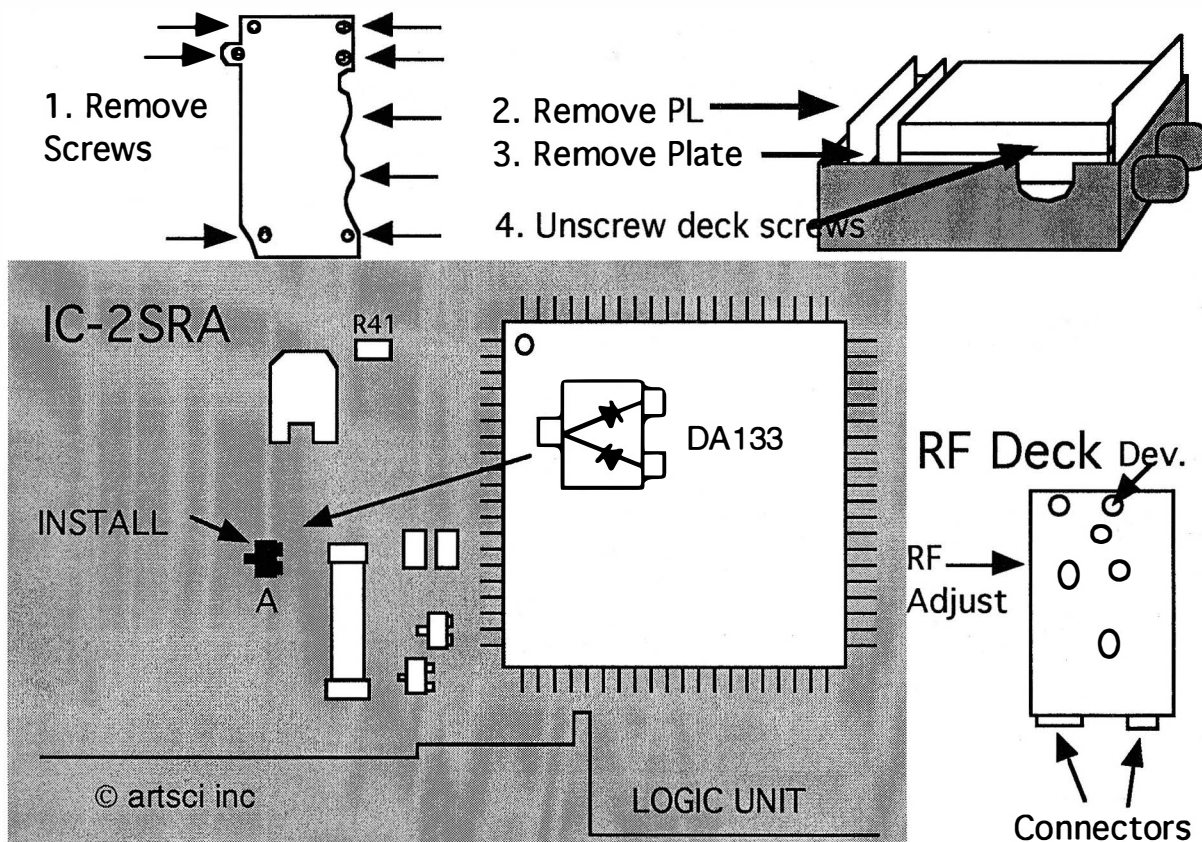
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ICOM IC-2SRA

EXPANDED RF

1. Remove battery and antenna.
2. Remove screws from back panel and battery plate and open radio.
3. Remove PL deck and power plate.
4. Unplug VHF & Receiver decks.
5. **Attach Chip diodes to location point D16** point A (MA133).
(Diode MA133 - ICOM part # 1790000860)
6. Reassemble the radio.
7. **Reset the CPU** (Push and hold [FUNCTION] & [A] & [CLR] and turn radio on)



IC-2SRA KEYBOARD COMMANDS:

RX Expansion Push and hold [CALL] & [F] & [LIGHT] and turn power on.
D9 on "RES" board may need to be removed

RANGE: 126 - 190 MHz

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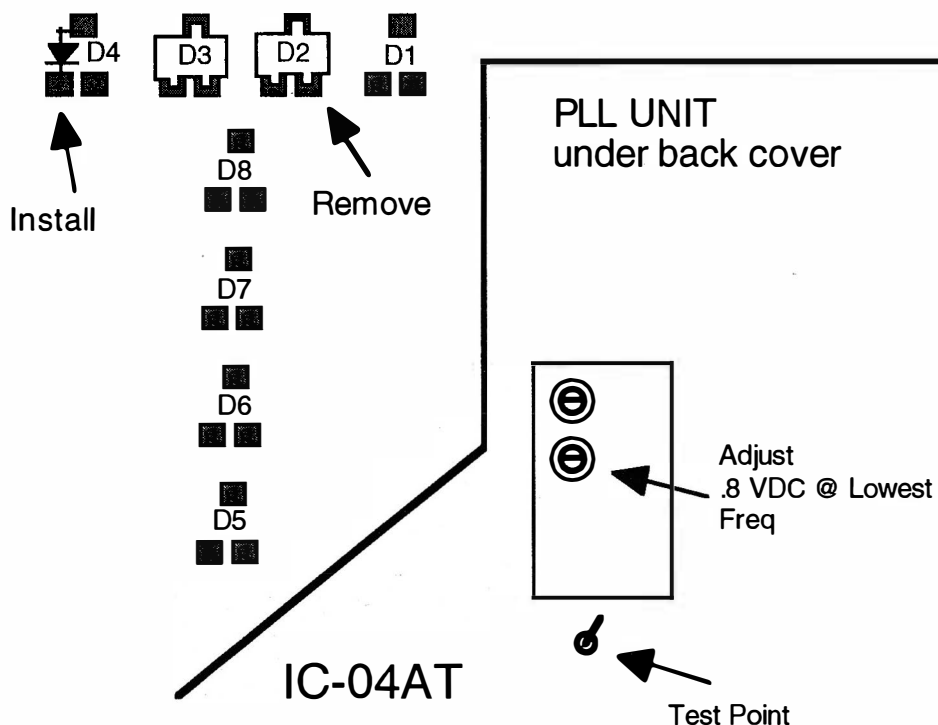


ICOM IC-04AT

EXPANDED RF

1. Remove battery and antenna.
2. Remove screws open case.
3. Locate and remove chip diode D2 on Logic unit.
4. Install a diode across pads of diode D4 (see drawing) 1N4148 or 1SS211
5. Reassemble the radio.
6. Reset the microprocessor. (Push button next to lithium battery or Hold [FUNCTION] and turn power on

Note Adjust VCO for .8 V. DC at lowest desired Freq. Measure at VCO test point.



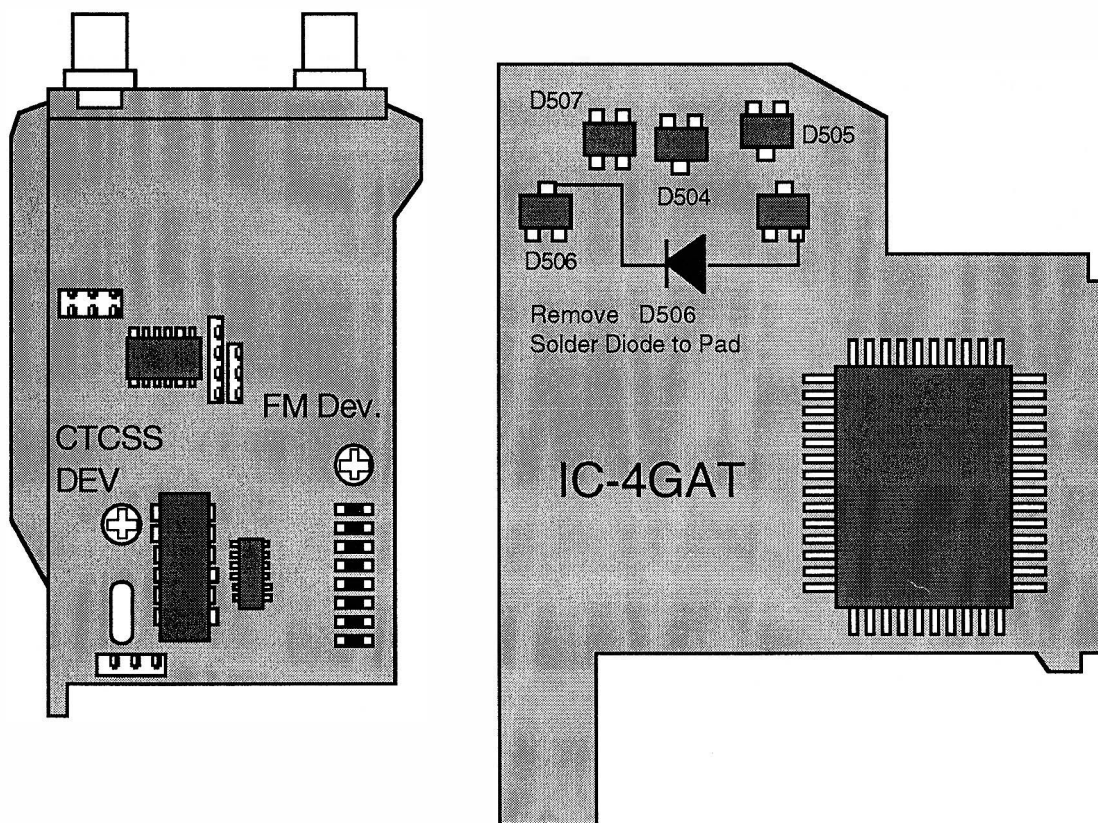
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ICOM IC-4GAT

EXPANDED RF

1. Remove battery and antenna.
2. Remove Screws and open radio
3. **Remove D506** (this part is already removed on US version)
4. **Attach Diode as shown** (Use 1N914 or equivalent Diode)
Make sure Diode leads will not short anything. Cover them in tape.
5. Reassemble the radio.
6. **Reset Radio.** (Turn radio on, Hold [LIGHT] & [FUNCTION], turn radio off and back on)



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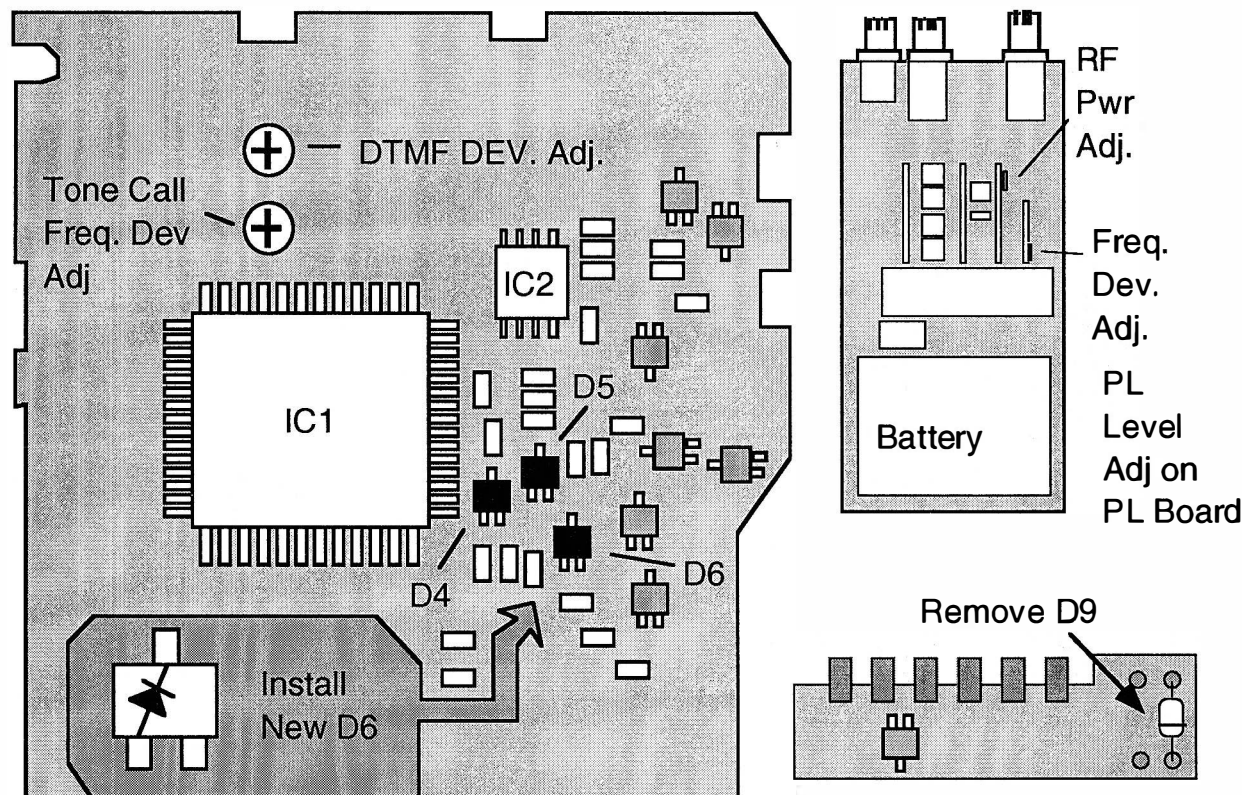
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ICOM IC-4SAT

EXPANDED RF

1. Remove Battery and antenna.
2. Remove Screws and open radio.
3. Locate and **remove diode D9** on LOGIC A unit (See Drawing)
4. Solder **install a chip diode in position D6**, (DA114 -T107).
(Remove the diode that is installed)
A 1N4148 or other diode can be used if extreme caution is taken.
5. Reassemble the radio.
6. **Reset the microprocessor.** (Press & hold [#], [B] & Light, Turn power on)



4SAT Range 435 MHz - 465 MHz. (any 30 MHz Segment from 400-490)

Optional Commands: Push [LAMP] & [Keyboard Key, see below] and Power on.
 [1] Enter 4 digits, [2] Enter 5 digits, [3] Enter 6 digits,
 [4] Pause Scan, [5] to see timer scan, [7] PS off
 [8] PS 1:4 125 msec on/500msec off, [9] PS 1:16
 [0] PTT Disable, [*] PTT Enable, [#] PTT Disable
 [A] Reset, [D] Display Test



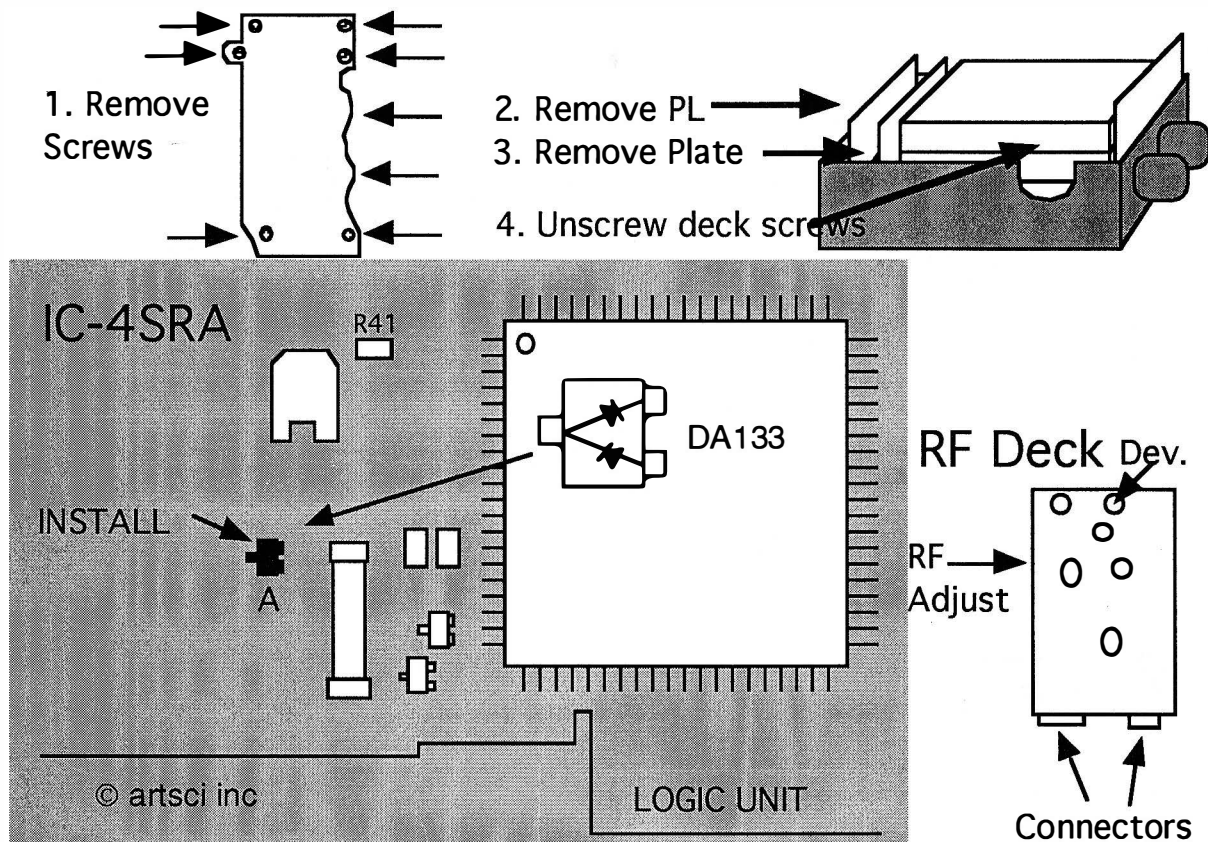
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ICOM IC-4SRA

EXPANDED RF

1. Remove battery and antenna.
2. Remove screws from back panel and battery plate and open radio.
3. Remove PL deck and power plate.
4. Unplug VHF & Receiver decks.
5. **Attach Chip diodes to location point D19** point A (MA133).
(Diode MA133 - ICOM part # 1790000860)
6. Reassemble the radio.
7. **Reset the CPU (Push and hold [3] & [B] [#] and turn on**
(Push and hold [FUNCTION] & [A] & [CLR] and turn radio on)



IC-2SRA KEYBOARD COMMANDS:

RX Expansion Push and hold [CALL] & [F] & [LIGHT] and turn power on.
D9 on "RES" board may need to be removed

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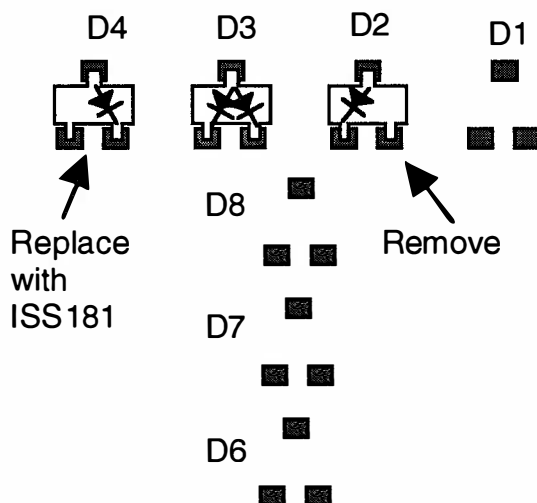


ICOM IC-12AT

EXPANDED RF

1. Remove battery and antenna.
2. Remove Screws and open radio.
3. Locate and **remove diode D2** (See Drawing)
4. Replace diode D4 with ISS 181 (A3)
5. Reassemble the radio.
6. **Reset the microprocessor.** (Hold [FUNCTION] and turn power on)

IC-12AT

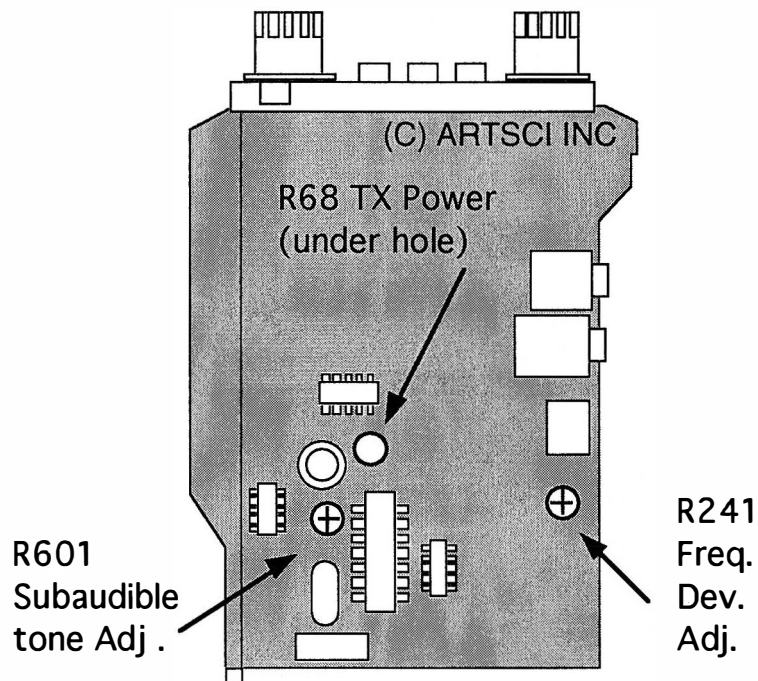


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ICOM IC-12GAT

ALIGNMENT CONTROLS



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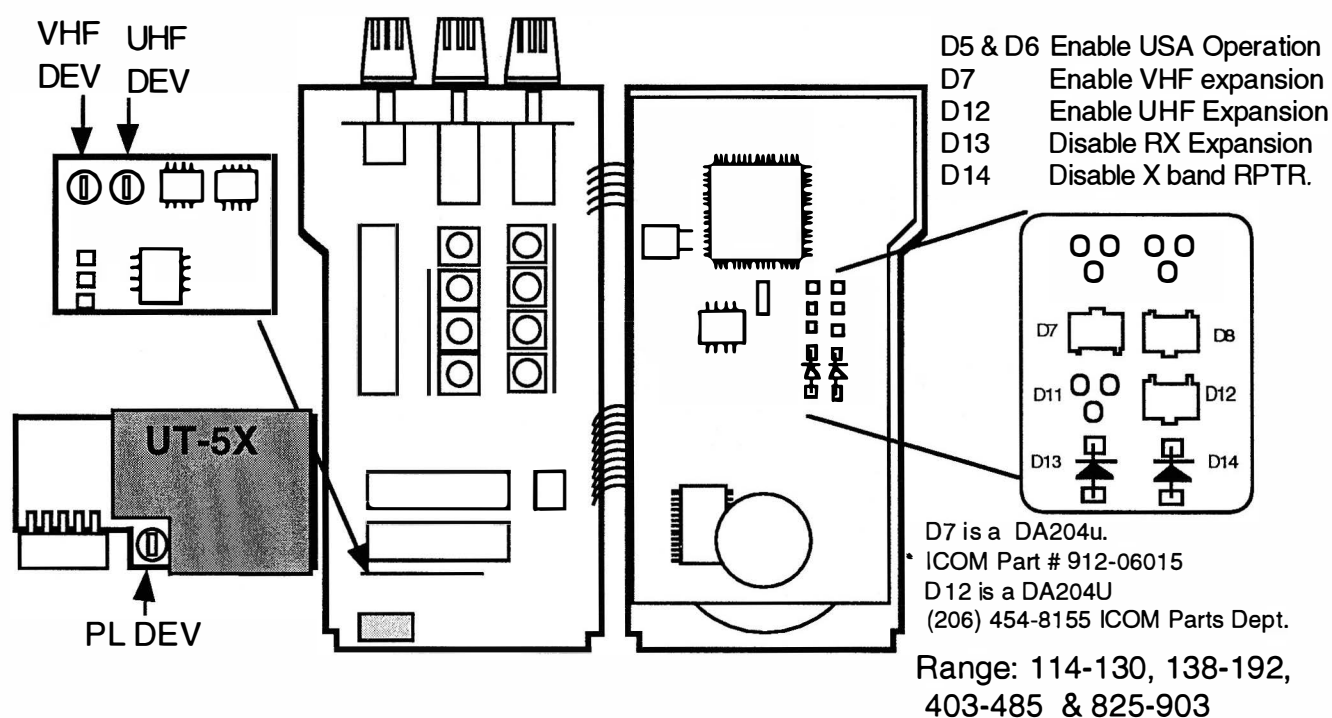
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ICOM IC-24

EXPANDED RF/ Crossband Repeater

1. Remove battery and antenna
2. Remove Screws and open radio
3. **Remove Diode D8.**
4. **Remove Diode D14** (Crossband Repeater)
5. **Remove Diode D13** (Expanded RX)
6. **Attach Diode DA204u to position D7**
7. **Attach Diode DA202u to position D12.** Note some models require a DA204u.
8. Reassemble the radio.
9. **Reset the microprocessor.** Press and hold [light] & [B] & [#] and turn power on.
Note: Press and hold [light] & [3] and turn power on for direct Freq. entry.
[light] & [2] will reset the radio for 10 MHz input operation.



CROSS BAND REPEATER PROCEDURES (VFO MODES ONLY)

TURN ON - HOLD [FUNCTION] & PRESS [C] THEN [5] THEN [D]

TURN OFF - HOLD [FUNCTION] & PRESS [D]

Note: When Transmitting in the 825-900 MHz range, the unit is simultaneously transmitting in the 400-450 MHz band!!



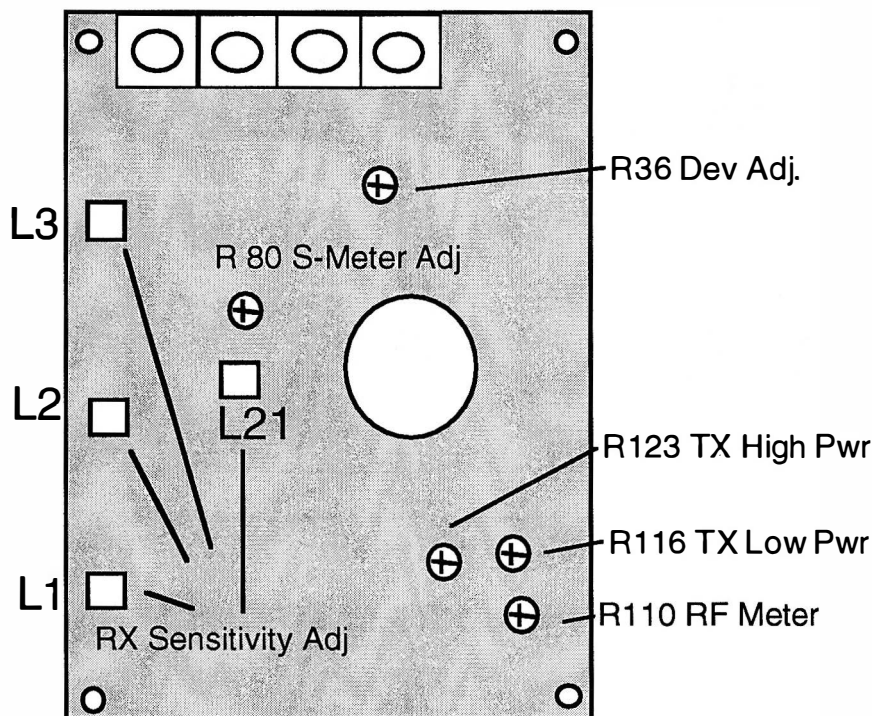
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ICOM IC-25

EXPANDED RF (keyboard mod)

1. Set offset to 0.0
2. Select VFO (A).
3. Press and hold [SIMP/DUP] and [NOR/REV].
4. Dial in desired frequency.
5. Release [SIMP/DUP] button.
6. Select the other VFO (B).
7. Repeat steps 3, 4 and 5
 - If VFO (B) can not be set, transfer VFO (A) to VFO (B) using the [WRITE] button as described on page 7, item 6, of the owners manual.
 - (NOTE: [SIMP/DUP] button must be out when the VFO is changed)
8. If the tuning knob is turned again, the radio will revert back within the normal band range.



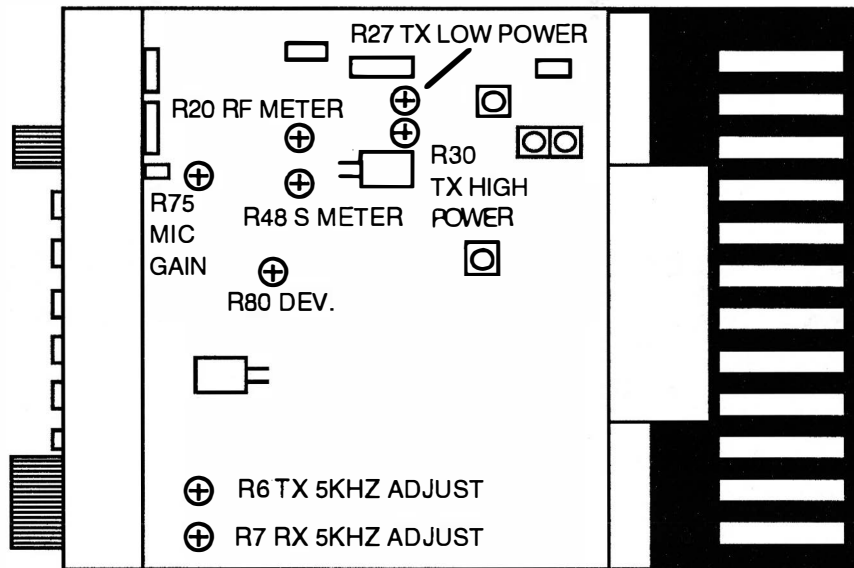
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ICOM IC-27A & H

ADJUSTMENT CONTROLS



CPU Reset by pressing the Reset button under the access cover

Note: There is no way to add offset to IC-27 D boards



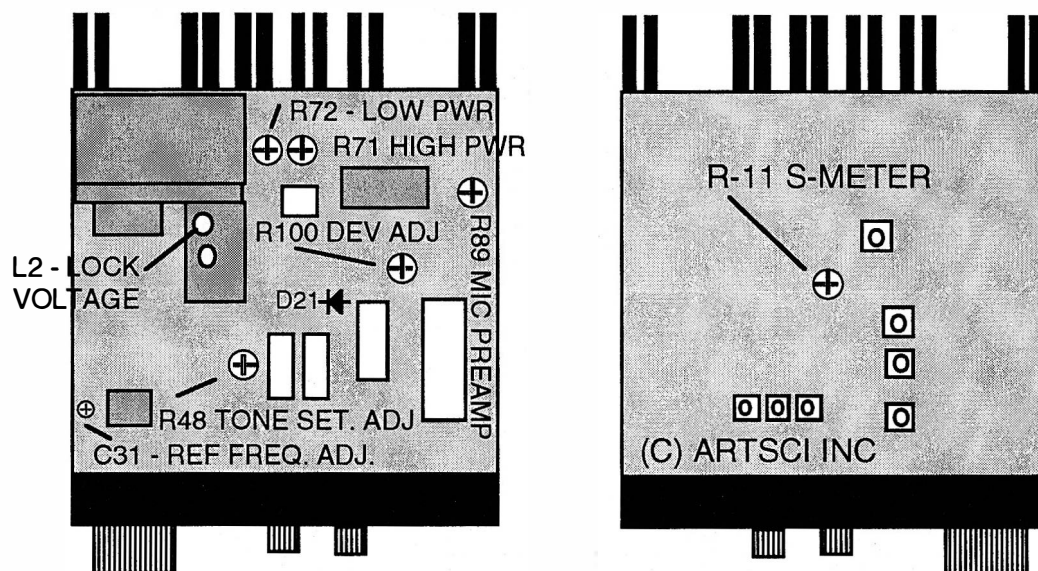
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ICOM IC-28A & H

EXPANDED RF

1. Remove Power and Antenna.
2. Remove screws and open case.
3. Locate and **cut Diode D21** inside the top of the circuit board.
4. **Reset the Microprocessor.** (insert a toothpick in hole located in corner of bottom cover.)
5. Reassemble the radio.



IC-28

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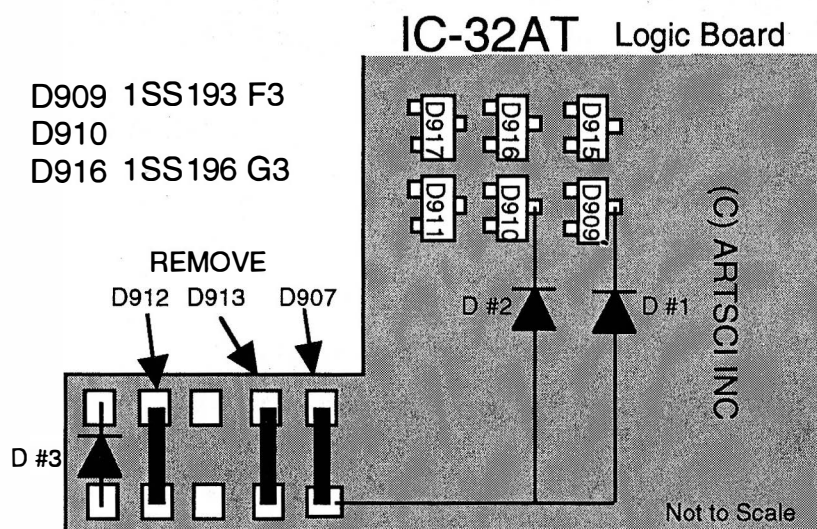


ICOM IC-32AT

EXPANDED RF / CROSS BAND REPEATER/ 10 MHz ENTRY

1. Remove battery and antenna.
2. Remove Screws and open radio.
3. **Remove D907** (150 MHz+) (this part is already removed on US version)
4. **Add Diode #1** (1N914).
5. **Remove D913** (450 MHz+).
6. **Add Diode #2** (1N914).
7. **Add diode #3** (1N914) 10 MHz.
8. **Remove D912** (Repeater mod).
9. **Reset the microprocessor.**(HOLD [FUNCTION] & [A] & [LIGHT] and turn power on)
10. Reassemble the radio.

Adjust C-510 to get .25 volts at UHF test point at lowest desired frequency.
C-510 is located in metal box. The test point is located next to the metal box.



CROSS BAND REPEATER PROCEDURES (Simplex Freqs only)

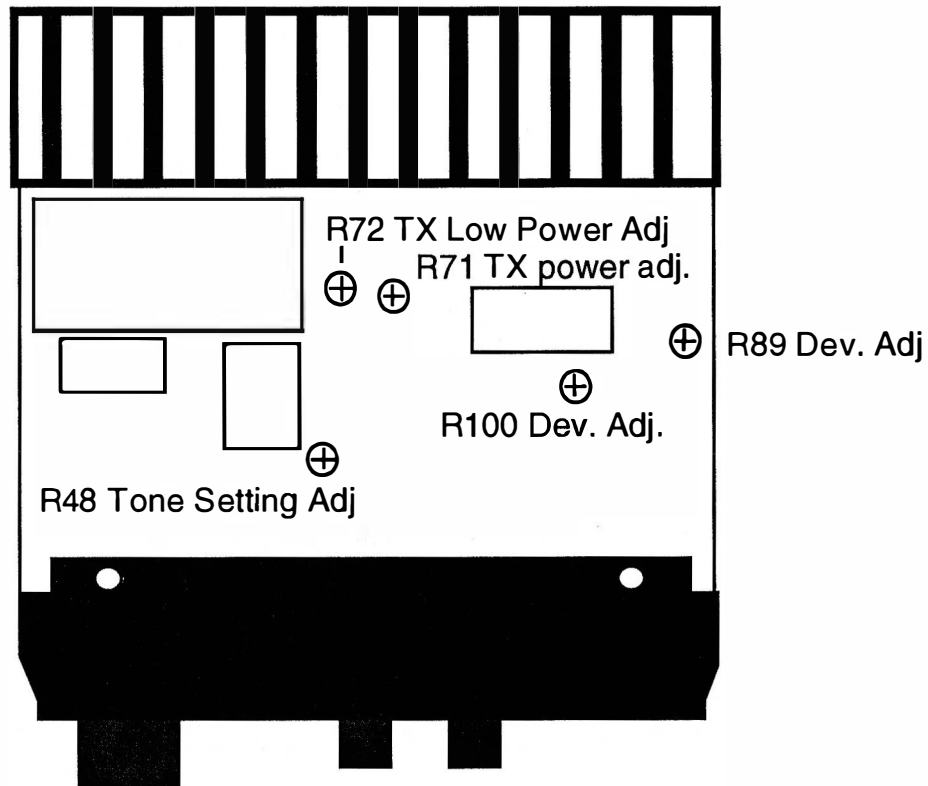
TURN ON - Press & Hold [Function], Press [C] key, Press [6] key, Press [D] key.
Release Function key.

TURN OFF - Press and Hold [Function], Press [D] key, Press [C] key. Release [Function]



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ICOM IC-38**ALIGNMENT CONTROLS****IC-38A**

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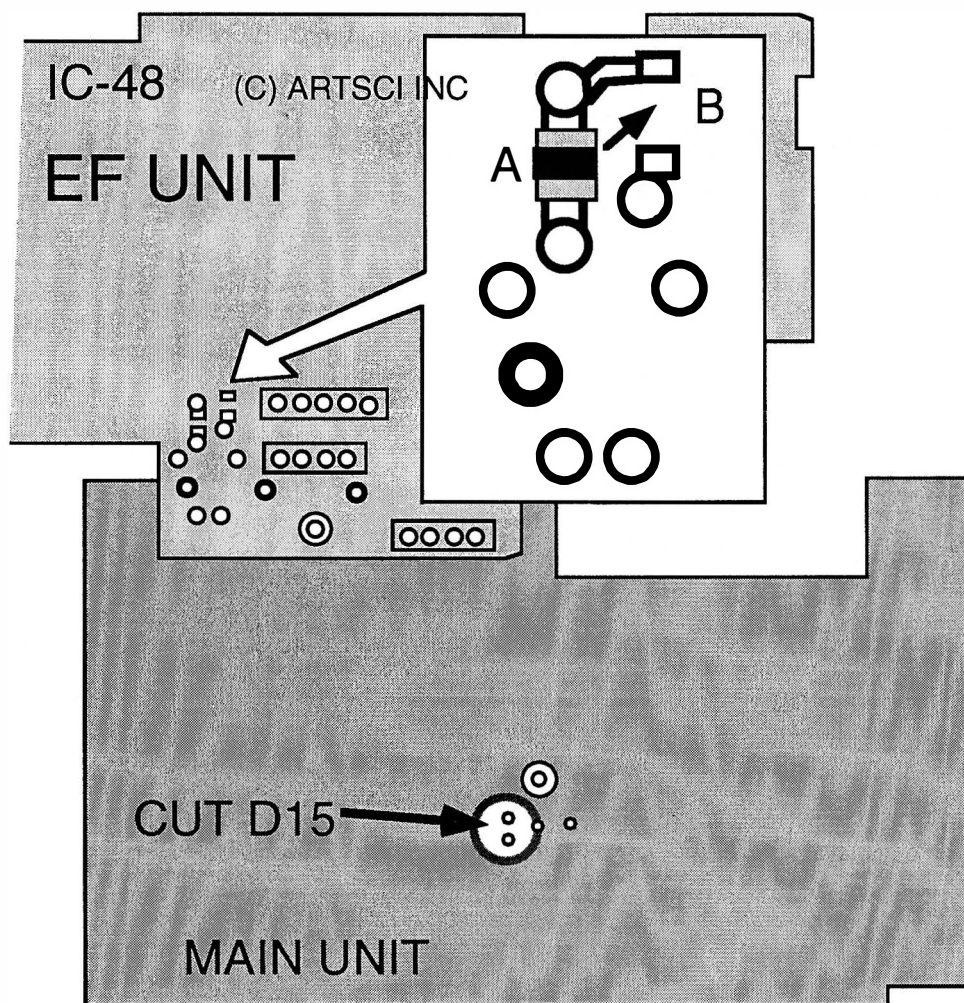
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ICOM IC-48A

EXPANDED RF

1. Remove power and antenna.
2. Remove screws open case.
3. Locate R55 on EF unit.
4. **Move R55 from A to B.**
5. **Locate and cut D15 on the main unit.**
6. Reassemble the radio.



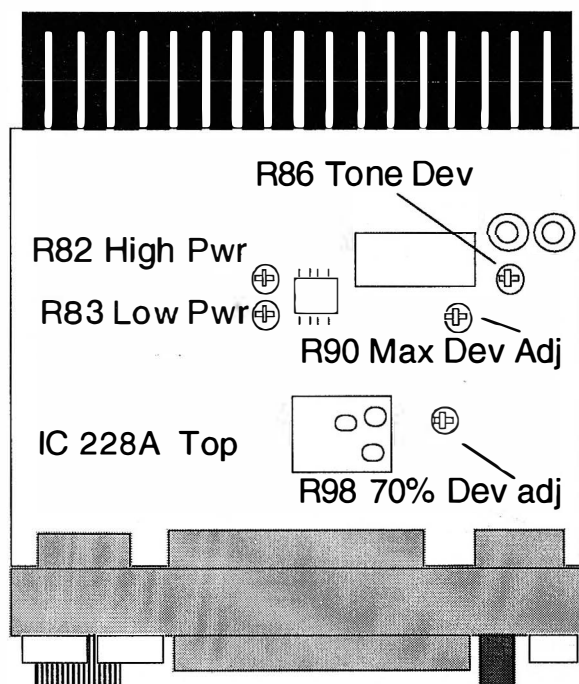
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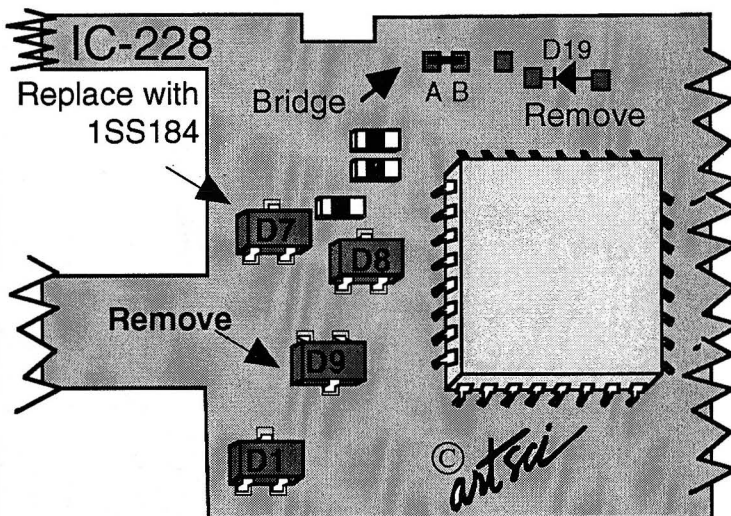
ICOM IC-228A

EXPANDED RF

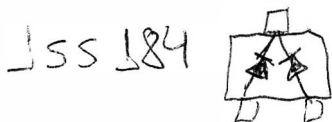
1. Remove power and antenna.
2. Remove screws open case of the EF Unit. (Control head).
3. **Remove diode D19** (for all Serial Numbers)
4. Replace chip diode D7 with an 1SS184) (228A Below ser# 02900 & 228H below ser# 06300)
4. Remove chip diode D9 (228A above ser# 02900 & 228H above ser# 06300)
5. Solder bridge Pads A & B (228A above ser# 02900 & 228H above ser# 06300)
6. Reassemble the radio
7. Reset the microprocessor (Push and hold [SQUELCH/Monitor] & [LOCK] and turn power on)



R36- S-Meter Adj located on bottom board



Note : Discriminator output on pin 9 of IC 1 (MC3357P)



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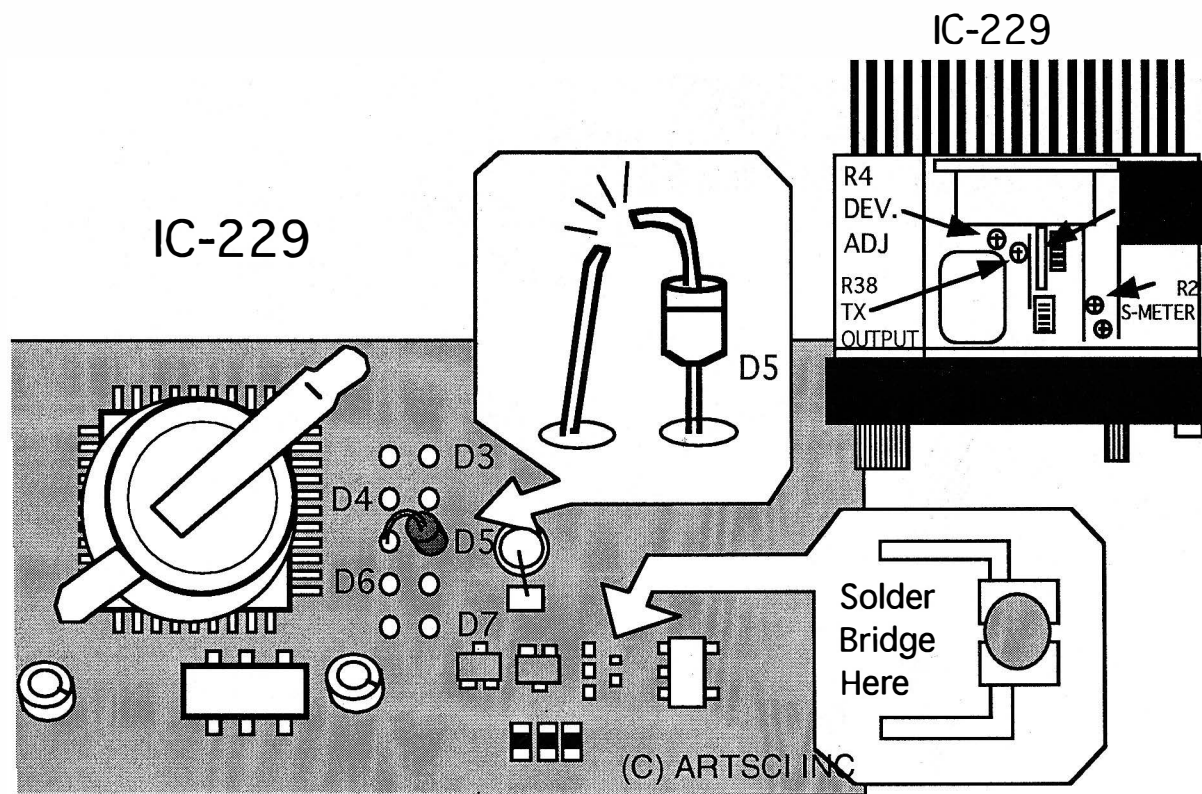
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ICOM IC-229

EXPANDED RF

1. Remove power and antenna.
2. Remove screws open case.
3. Open the front control panel and expose the logic board.
4. Locate and **cut Diode D5** on the LOGIC board
5. **Install a jumper at "land" point.**
6. Reassemble the radio.
7. **Reset the microprocessor.** (Press and hold [SET] & [MW] and turn power on)



FREQ 118.000 - 135.995 MHz (AM) RX
136.000 - 174.000 MHz (FM) RX

136.000 - 174.000 MHz (FM) TX



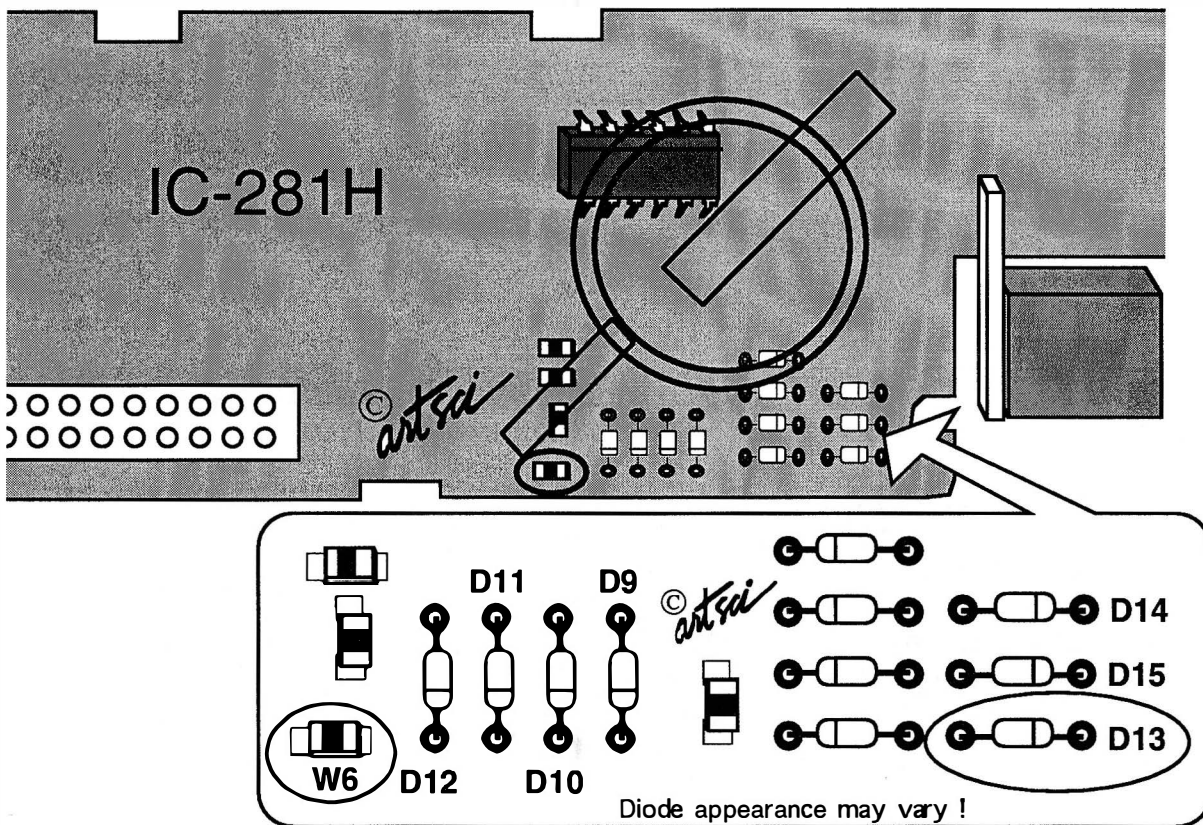
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ICOM IC-281

EXPANDED RF

1. Remove power and antenna.
2. Remove screws open case.
3. Locate logic board.
4. Locate and **remove jumper W6** (RX Mod)
5. Locate and **cut Diode D13**.
6. Reassemble the radio.
7. You may be required to reset the microprocessor. (see owners manual)



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ICOM IC-290

EXPANDED RF (Keyboard mod)

1. Set the offset to 0.0
2. Select "DUPLEX" mode (+ or -).
3. Select a VFO.
4. Press and hold the [WRITE] button.
5. Dial the desired frequency.
6. Release the [WRITE] button.
7. If desired, repeat the above steps for the other VFO.
8. Set offset back to 0.6
9. When changing frequency, remember to hold down the [WRITE] button or the display will revert back to within the normal band limits.



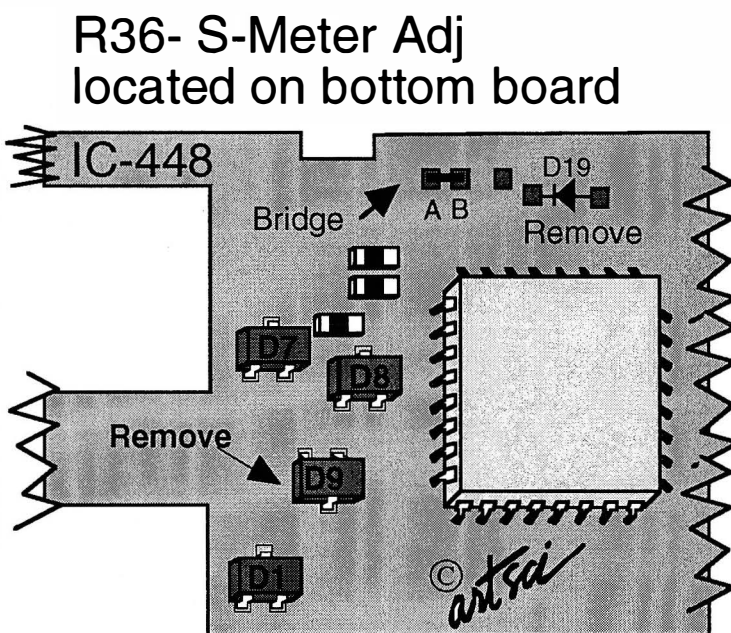
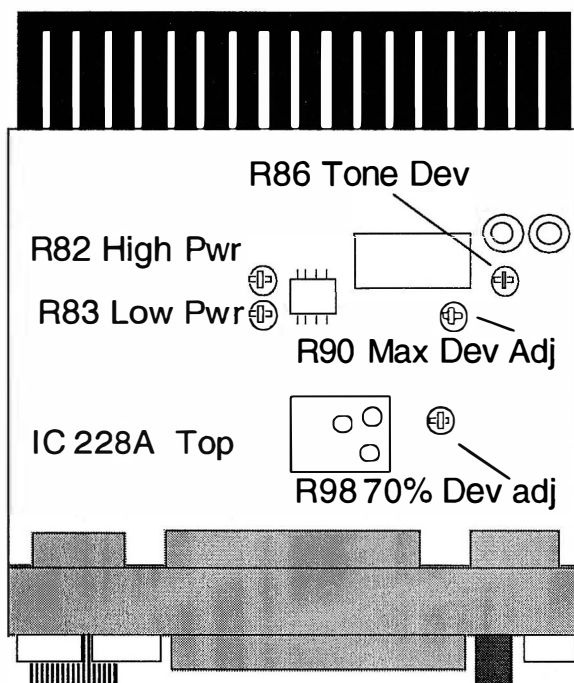
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ICOM IC-448A

EXPANDED RF

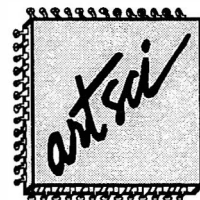
1. Remove power and antenna.
2. Remove screws and open the case.
3. **Remove diode D19**
4. **Remove chip diode D9**
5. **Solder bridge Pads A & B**
6. **Install Diode D7. (part # 1SS193)**
7. Reassemble the radio.
8. **Reset the microprocessor** (Push and hold [SQUELCH/MONITOR] & [LOCK] and turn power on.



Note : Discriminator output on pin 9 of IC 1 (MC3357P)

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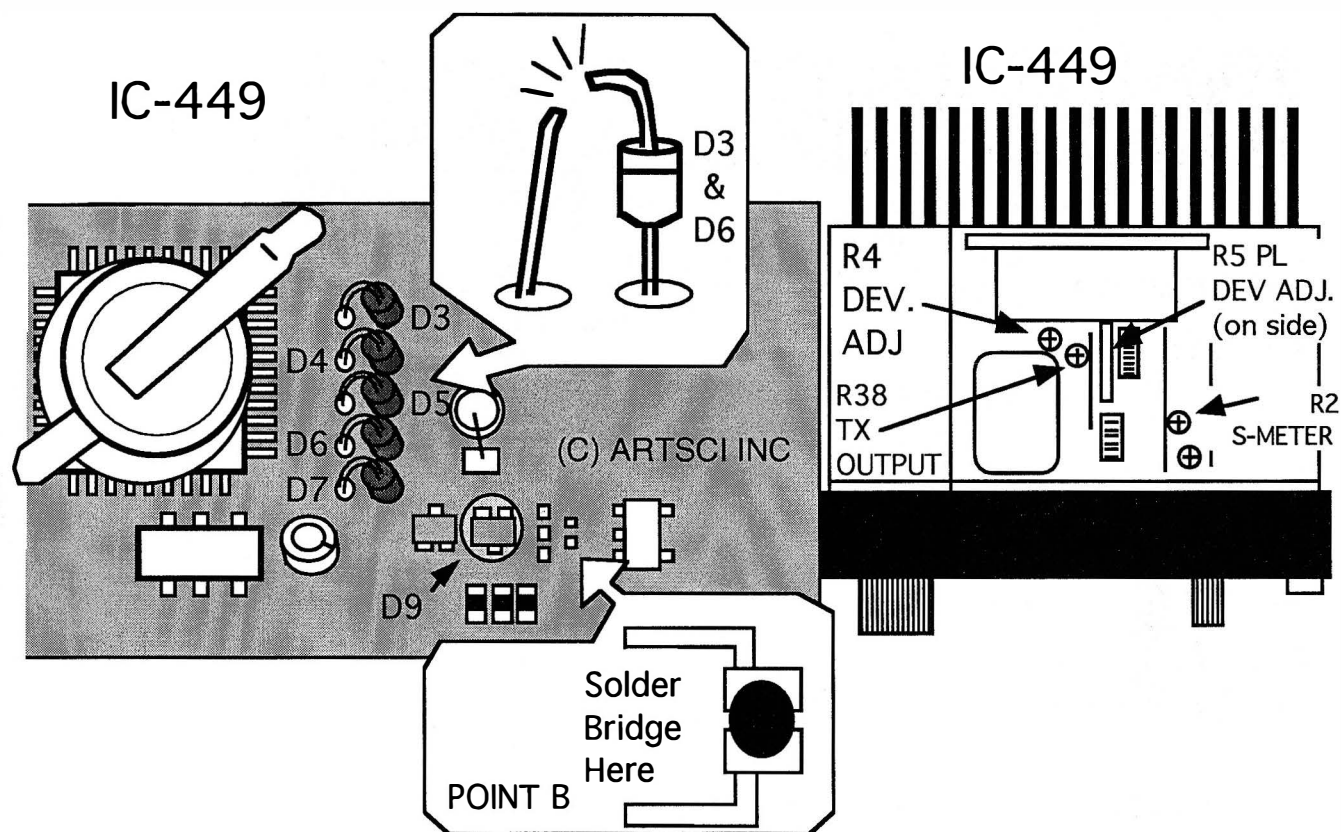
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ICOM IC-449

EXPANDED RF/ ALIGNMENT CONTROLS

1. Remove power and antenna.
2. Remove screws and open the case.
3. **Locate and short "point B".**
4. **Locate and cut diode D3.**
5. **Locate and cut diode D6.**
6. **Install diode D9 (1SS187).**
7. Reassemble the radio.
8. **Reset the microprocessor** (Press and hold [SET] & [MW] and turn power on.



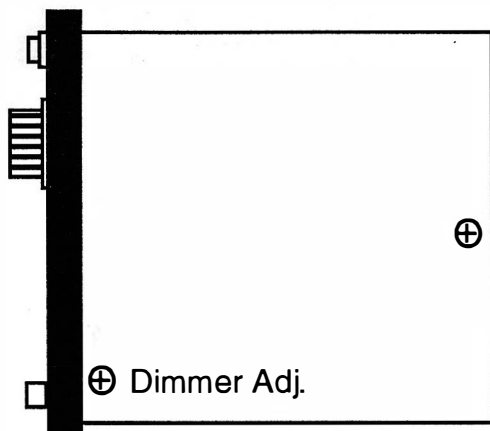
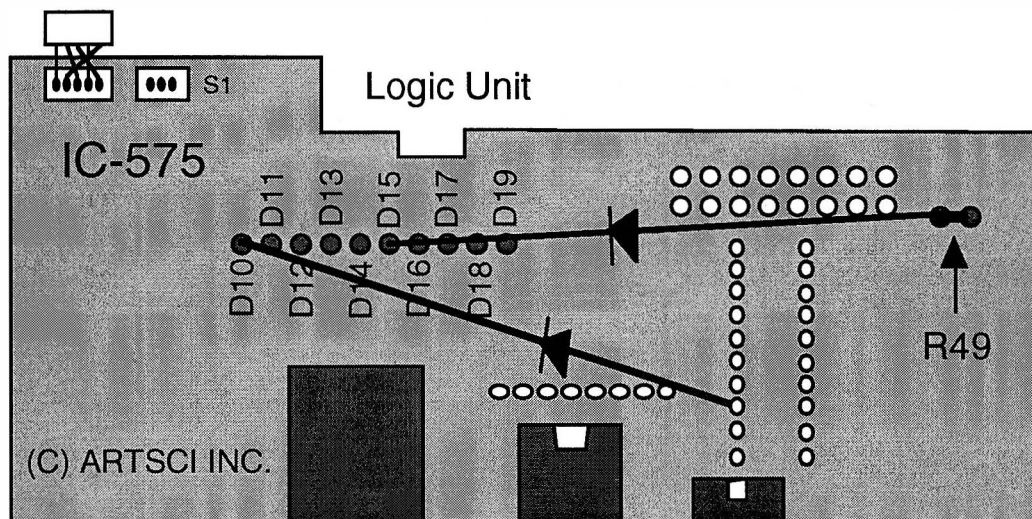
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ICOM IC-575

EXPANDED RF

1. Remove power and antenna.
2. Remove screws open case.
3. Locate the Logic Unit. It is located under the PA unit. (the PA unit has the speaker in it.) Follow the instruction used when installing the UT-34 Tone Squelch unit.
4. **Attach two diodes as shown.** (any standard diode)
D10 to 3rd pin & R49 to D15
5. Reassemble the radio.
6. **Reset the microprocessor** (Press and hold [M-CL] and turn power on)



Range FX 26 - 56 MHz
 TX 26 - 56 MHz

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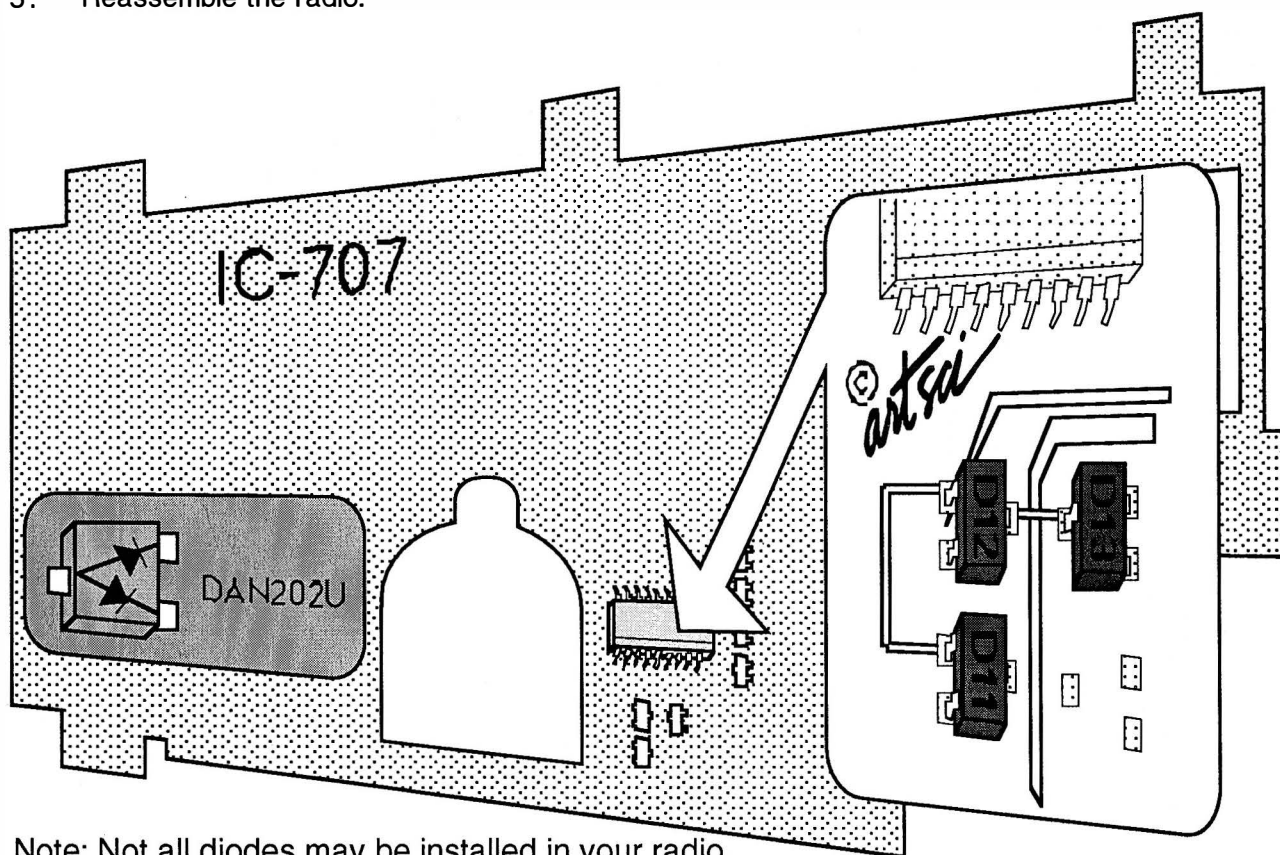
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ICOM IC-707

EXPANDED RF

1. Remove power and antenna.
2. Remove screws open case.
3. Locate Front Unit board.
4. Determine the version of the radio you have.
 - Version 1:** Locate and **remove Diode D12**
 - Version 2:** Locate and **remove Diode D13.**
 - Version 3:** Locate and **remove Diode D12**
Add Diodes D11 and D13 (ICOM # DAN202U, Symbol on diode "U")
 - Version 4:** Locate and **remove Diodes D12 and D13.**
5. Reassemble the radio.



Note: Not all diodes may be installed in your radio.
 The above picture shows all diodes for reference only



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ICOM IC-720A

EXPANDED RF

1. Remove power and antenna.
2. Remove screws open case.
3. Locate main board and **cut light blue wire**, pin 1 of plug K-10
4. Reset the Microprocessor.
5. **Reassemble the radio.**

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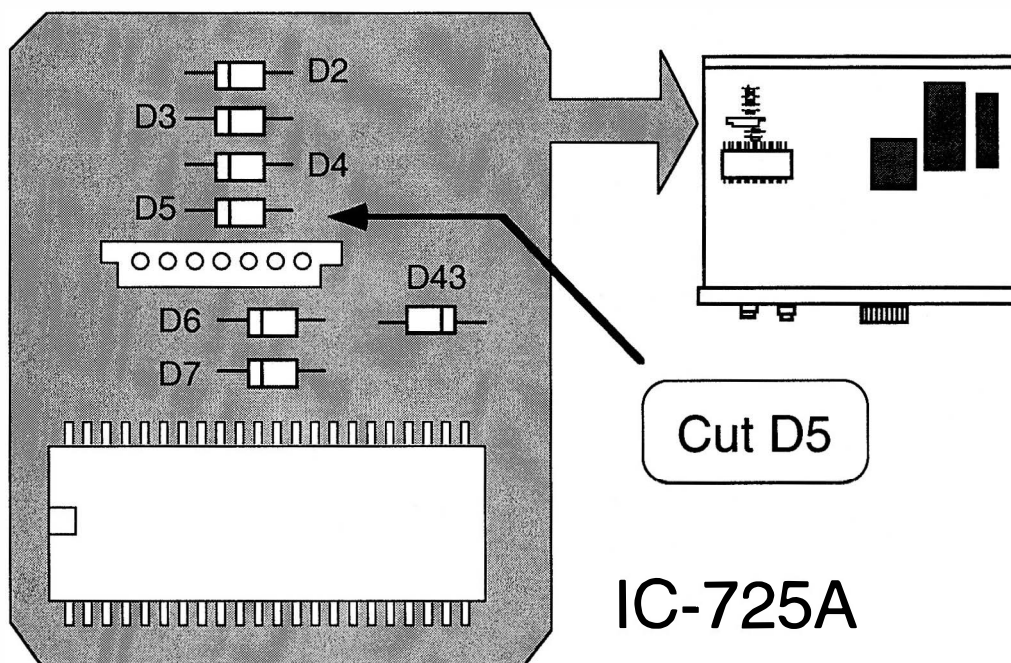
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ICOM IC-725A

EXPANDED RF

1. Remove power and antenna.
2. Remove screws open case.
3. Locate PLL board and **cut diode D5**.
4. **Reset the microprocessor.** (Hold [FUNCTION] & [MW] and turn power on)
5. Reassemble the radio.



IC-725A



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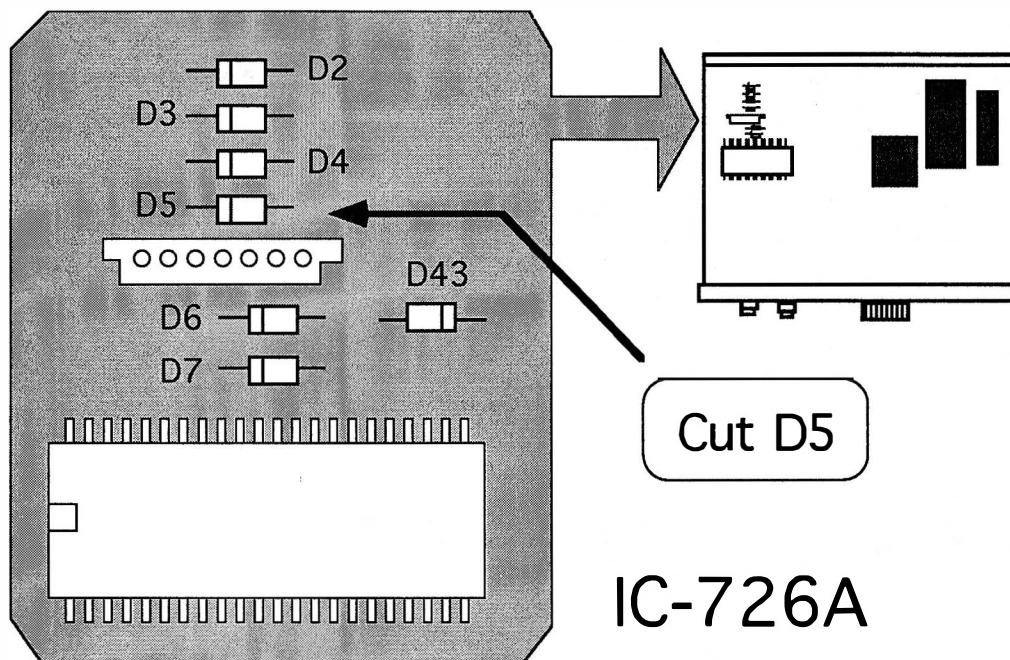
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ICOM IC-726

EXPANDED RF No 50 MHz expansion

1. Remove power and antenna.
2. Remove top and bottom covers.
3. Locate PLL circuit board pictured below.
4. **Cut Diode D5.**
5. Reassemble the radio.
6. Reconnect the power.
7. **Reset the microprocessor** (Hold [FUNCTION] & [MW] and turn power on)



IC-726A

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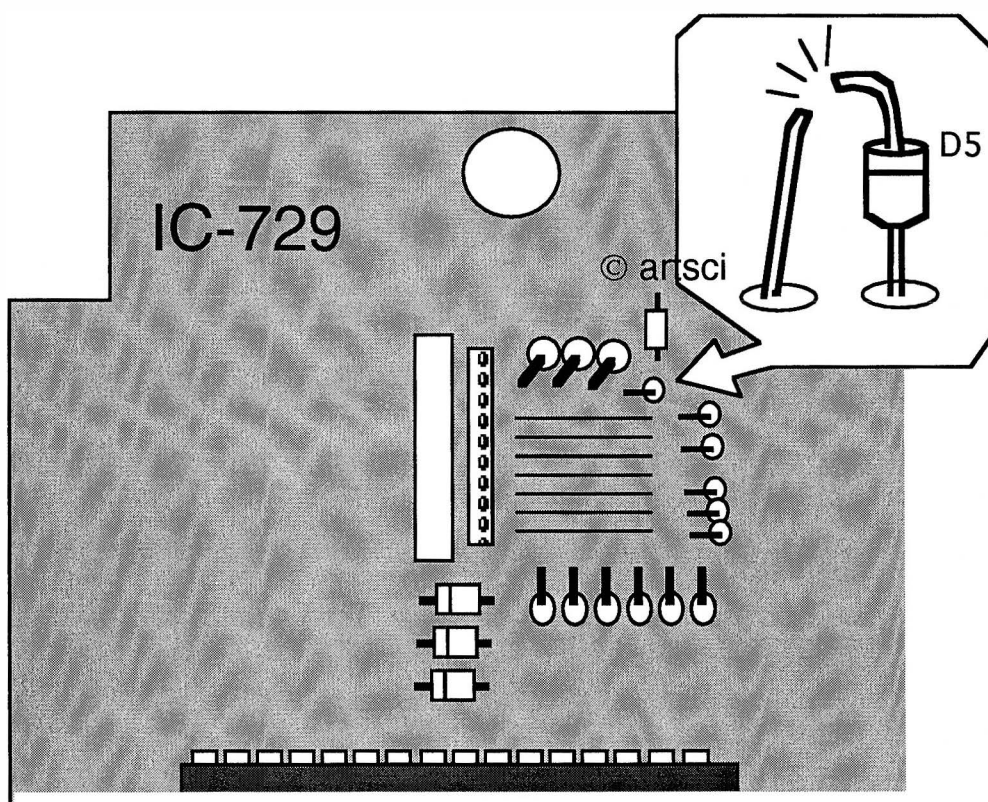
ICOM IC-729

EXPANDED RF

HF Expansion only.

NO 50 MHz expansion available

1. Remove power and antenna.
2. Remove screws open case.
3. Locate PLL board.
4. Locate and **cut diode D5**
5. Reassemble the radio.
6. **Reset the microprocessor** (Press & Hold [P] & [MW] and turn power on)



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ICOM IC-730

EXPANDED RF

1. Remove power and antenna.
2. Remove screws open case.
3. Locate RF board.
4. **Cut green wire**(labeled 'D')
5. **Cut resistor R-48**
6. **Reset the microprocessor.** (See owners manual)
7. Reassemble the radio

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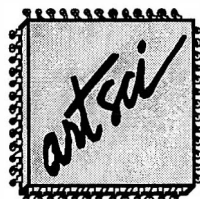
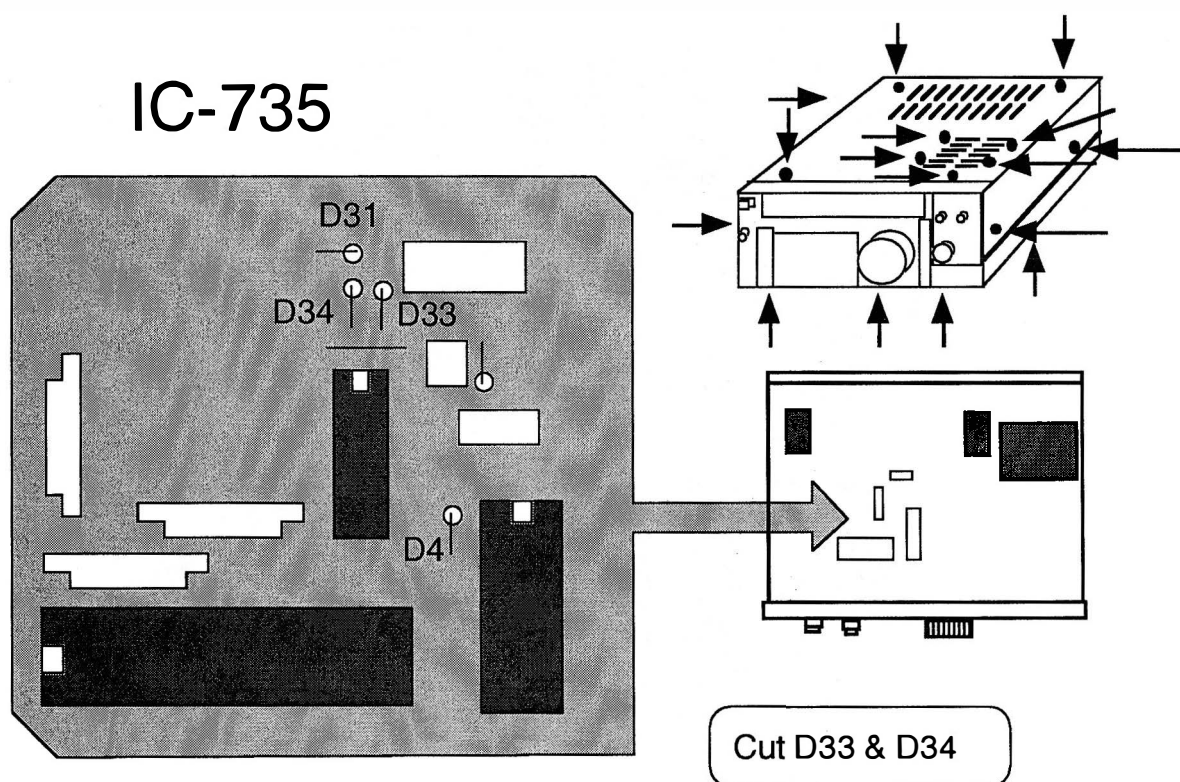


ICOM IC-735

EXPANDED RF

1. Remove power and antenna.
2. Remove screws and open top cover.
3. Remove screws and set PA unit aside.
4. Locate diodes D33 and D34 on the top of the PLL circuit board.
5. **Cut the Teflon covered leads of Diodes D33 and D34.**
6. Reassemble the radio.

Note: Accessing the main Board may require taking out many of the other components of the radio.



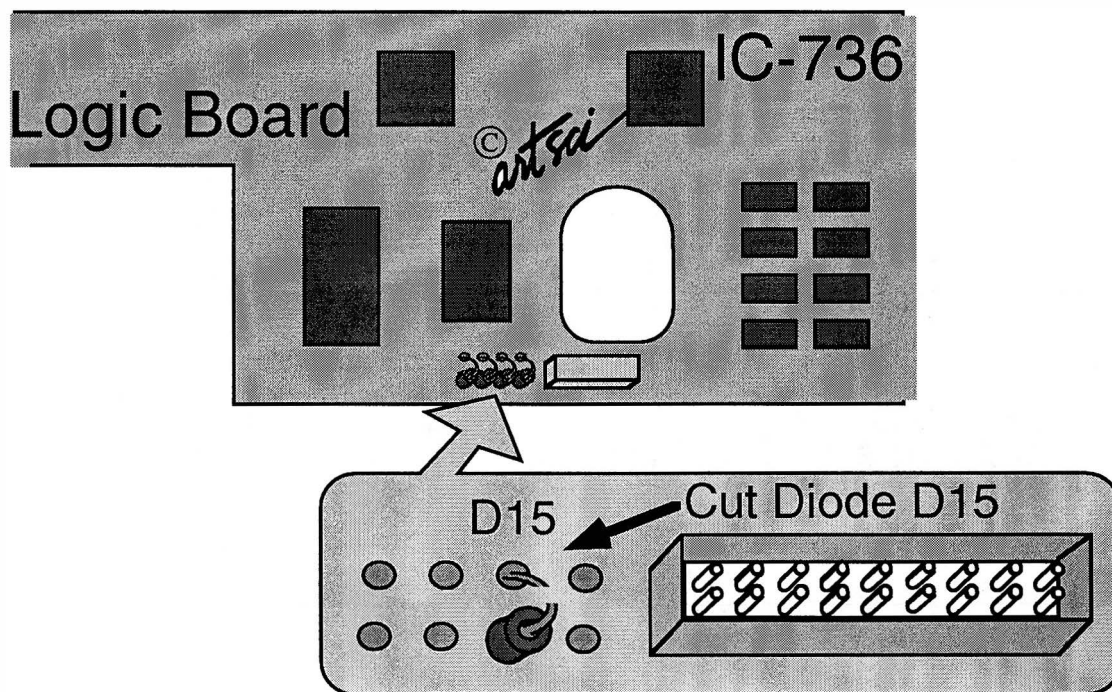
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ICOM IC-736, IC-738

EXPANDED RF
1.6 - 33.0 MHz & 45 - 60 MHz

1. Remove power and antenna.
2. Remove screws and remove covers.
3. Locate Logic board (front of radio).
4. Locate and **cut Diode D15** (near connector, see drawing)
Diode D14 is the expanded RX diode make sure it is removed.
5. Reassemble the radio.
6. Reset the microprocessor if required (see owners manual)



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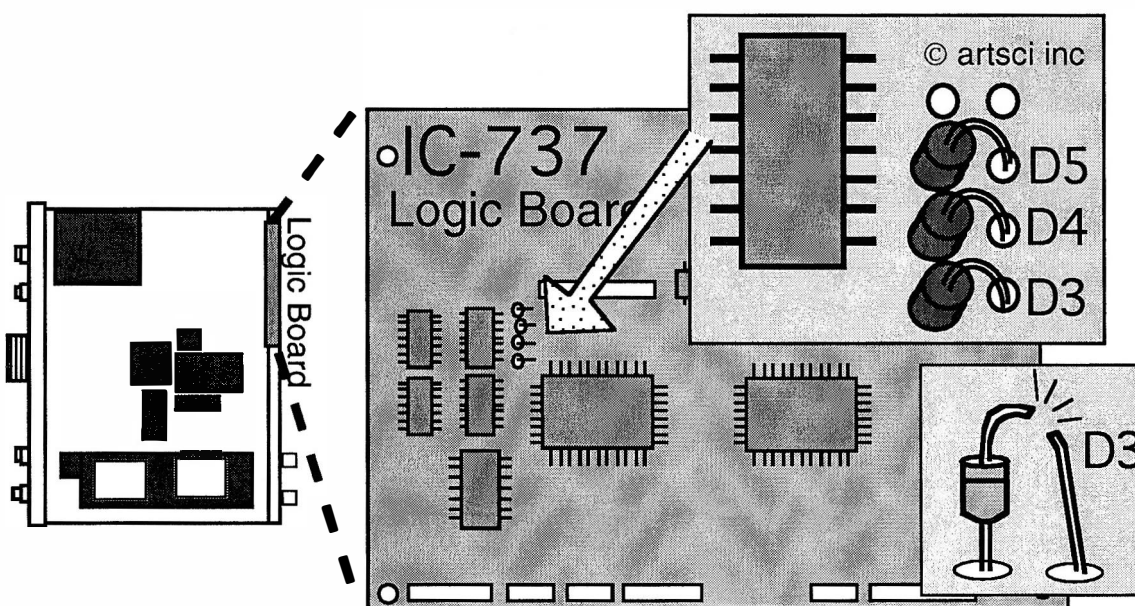


ICOM IC-737

EXPANDED RF

1. Remove power and antenna.
2. Remove screws and open top cover.
3. Remove screws and open bottom cover.
4. Remove screws and remove PA unit.
5. Remove screws and fold out front display.
6. Locate Logic Unit on back of radio.
7. Locate diodes D3 on the LOGIC circuit board.
8. **Cut Diode D3.**
9. Reassemble the radio.

Note: Accessing the logic Board may require taking out many of the other components of the radio.



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ICOM IC-740

EXPANDED RF

1. Remove power and antenna.
2. Remove screws open case.
3. Locate RF board.
4. **Cut (white resistor) jumper** located between D31 and 'C' wire.
5. **Reset the microprocessor.**
6. Reassemble the radio.

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ICOM IC-745

EXPANDED RF

1. Remove Power and Antenna.
2. Remove screws open case.
3. Locate RF board on the side of the radio.
4. **Cut the light brown wire on J7 Pin 1.**
5. Reassemble the radio.



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ICOM IC-751

EXPANDED RF

OLDER VERSION

1. Remove Power and Antenna.
2. Remove screws open case.
3. Locate RF board on the side of the radio.
4. **Cut the black wire on J2 Pin 1.**
5. Reassemble the radio.

NEW VERSION IC-751A

1. Remove Power and Antenna.
2. Remove screws open case.
3. Locate noise blanker board. (Near upper left hand of the front panel)
4. **Locate and cut resistor R34.** (far left end of the noise blanker board)
5. Reassemble the radio.

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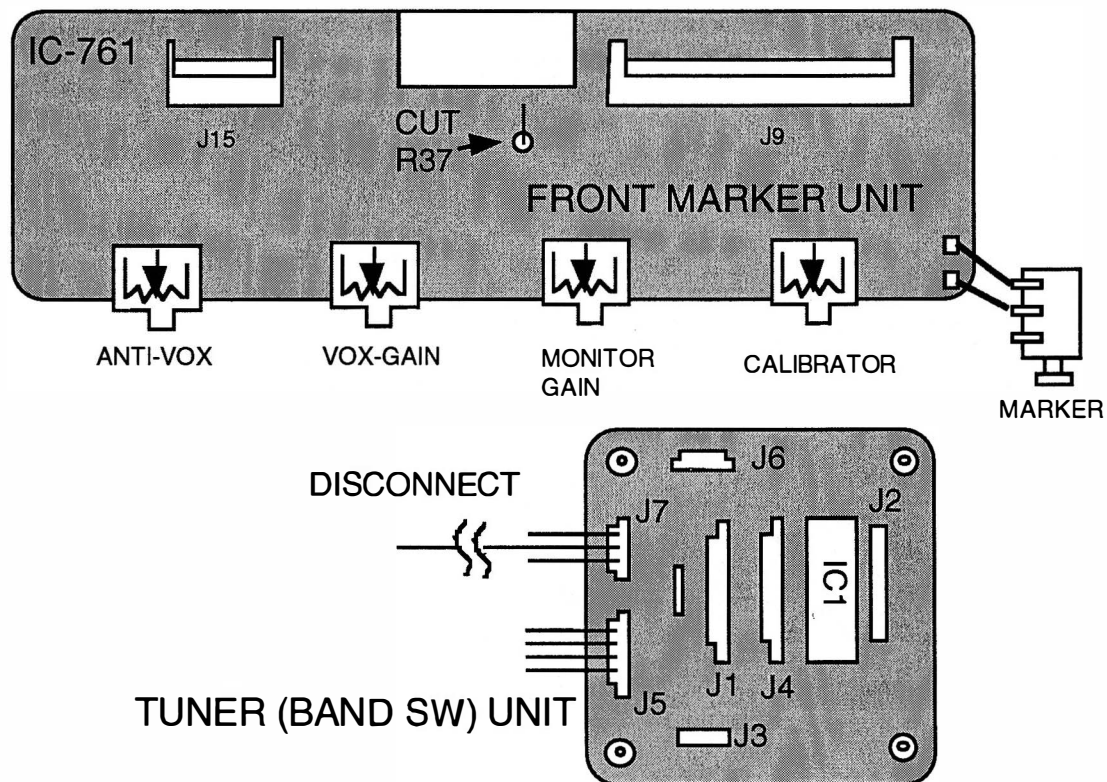
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ICOM IC-761

EXPANDED RF

1. Remove power and antenna.
2. Remove screws open case (top and bottom covers).
3. Locate front (Marker) Unit. (Behind the monitor gain controls)
4. Locate and **cut Resistor R37**.
5. Position radio normal side up and locate the Tuner band switch unit.
(Located on top of the tuner unit and behind the keyer unit)
6. **Disconnect the mute line** (Middle wire) from the connector J407.
(J407 is plugged into connector J7 on the Tuner band unit)
7. Reassemble the radio.
8. **Reset the microprocessor.** (Hold [M-CLEAR] and turn power on)



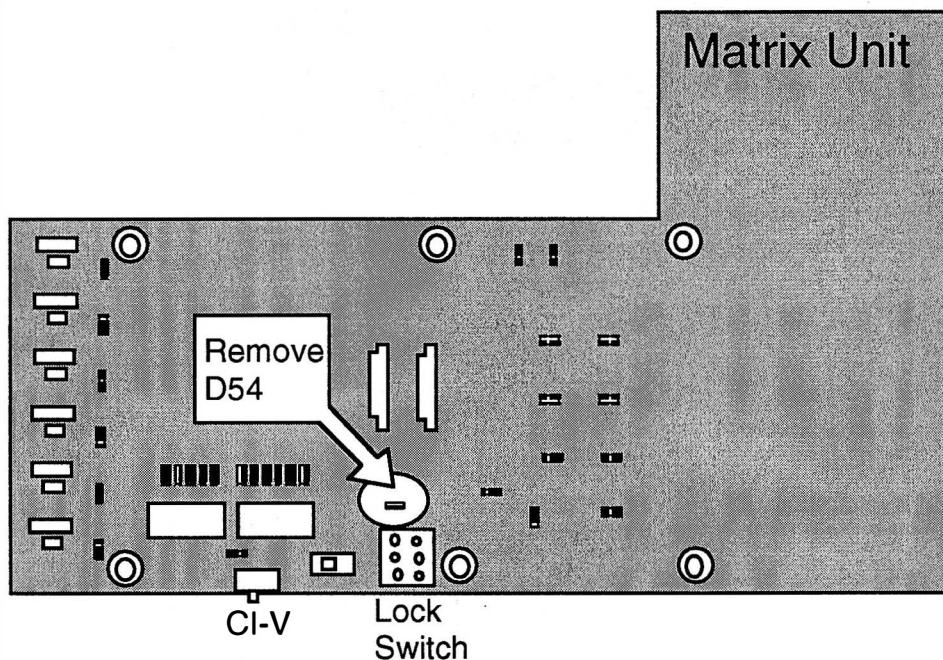
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ICOM IC-765

EXPANDED RF

1. Remove power and antenna.
2. Remove screws and open bottom cover.
3. Locate and **remove diode D54**.
Note: (It is located on the "L" shaped board mounted vertically).
(Positioned just above the "LOCK" switch)
4. Reassemble the radio.
5. **Reset the microprocessor.** (Hold [M-CLEAR] and turn power on)



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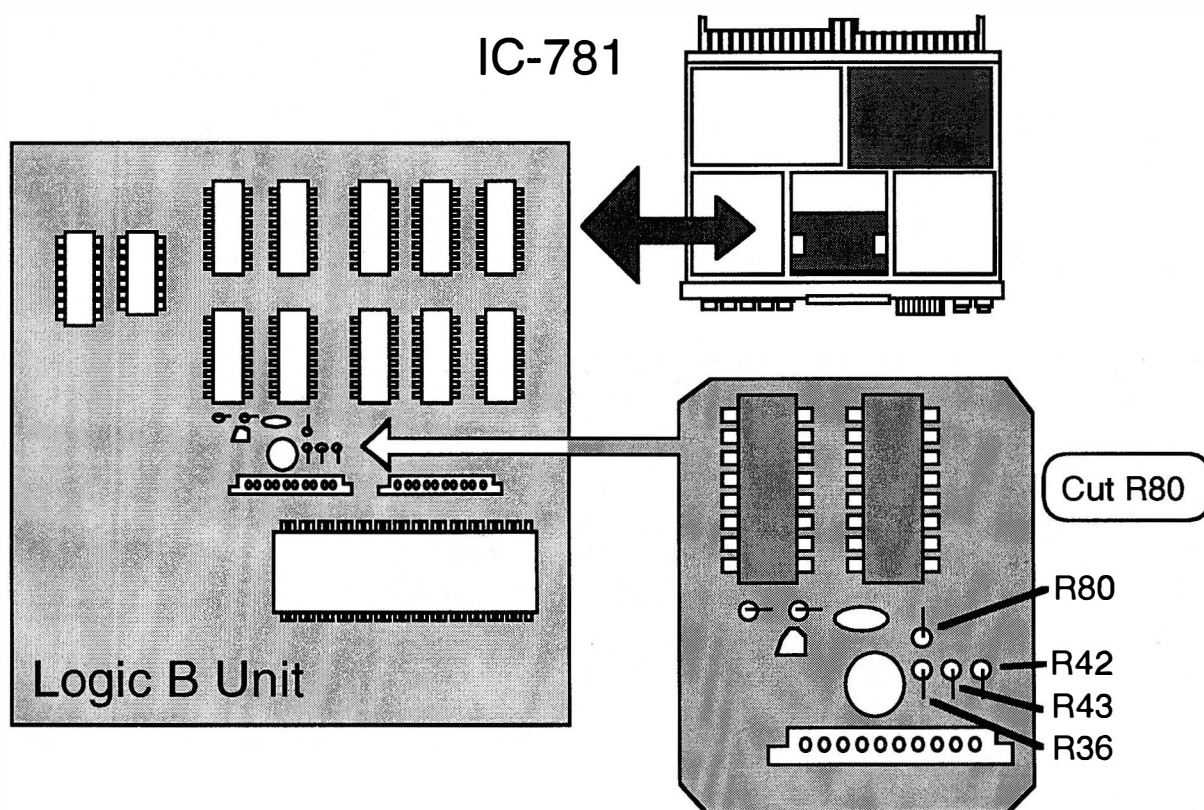
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ICOM IC-781

EXPANDED RF

1. Remove power and antenna.
2. Remove screws open case.
3. Locate and **cut resistor R80** on Logic B unit.
4. Reset the microprocessor.
5. Reassemble the radio
6. **Reset the microprocessor.** (Hold [M-CLEAR] and turn power on)



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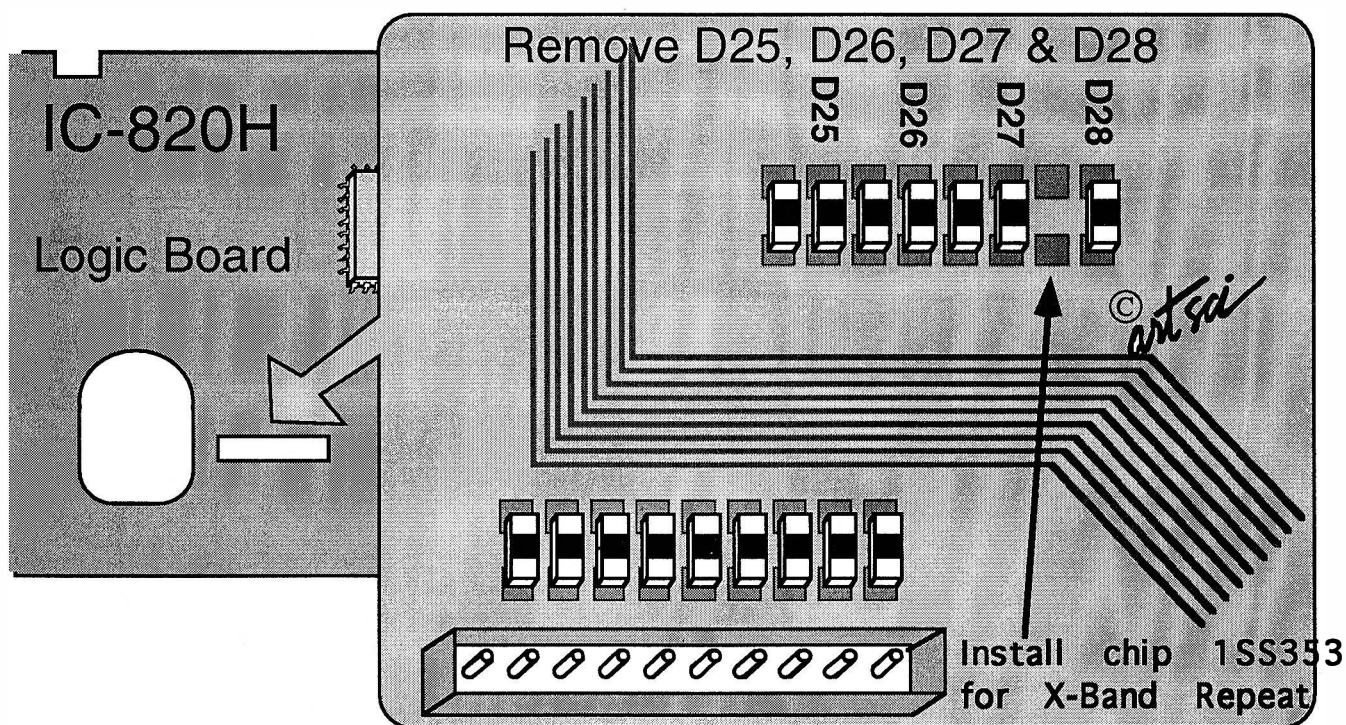
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ICOM IC-820

EXPANDED RF

136 - 174 MHz & 420 - 460 MHz

1. Remove power and antenna.
2. Remove screws and remove covers.
3. Locate Logic board (front of radio).
4. Locate and **cut Diode D25, D26, D27 & D28** (see drawing)
Diode D25 & D27 is VHF Diodes, D26 & D28 are the UHF Diodes .
5. Install a 1SS353 in position shown. (for cross band repeater)
6. Reassemble the radio.
7. Reset the microprocessor if required (see owners manual)



Cross Band operation:

- TURN ON Set frequencies
 Press [LOCK] & turn radio off
 Press and hold [M/S] and turn power on
- TURN OFF Press [LOCK]

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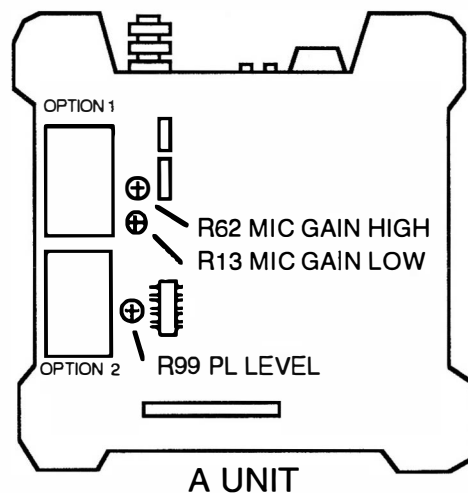
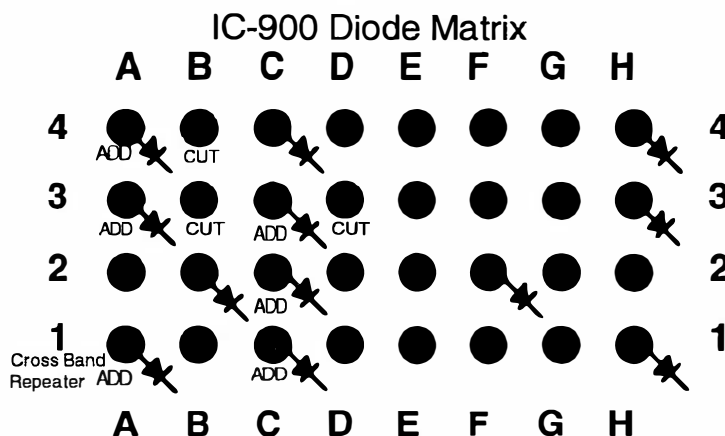
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ICOM IC-900

EXPANDED RF / CROSS BAND REPEATER

1. Open Control Head
2. Locate Diode Matrix on Display B board of Control Head.
3. **Add and remove Diodes according to drawing**
4. Reassemble control Head.
5. Open Interface A unit.
6. Change the switch position from "1" (factory) to "2" on interface A board (below the tone units).
7. Reassemble Interface A.
8. **Reset the microprocessor.** (Press and hold [MR] and turn power off and back on)



CROSS BAND REPEATER PROCEDURES (Simplex Freqs only)

TURN ON - Turn LOCK switch ON.

TURN OFF - Turn LOCK switch OFF.



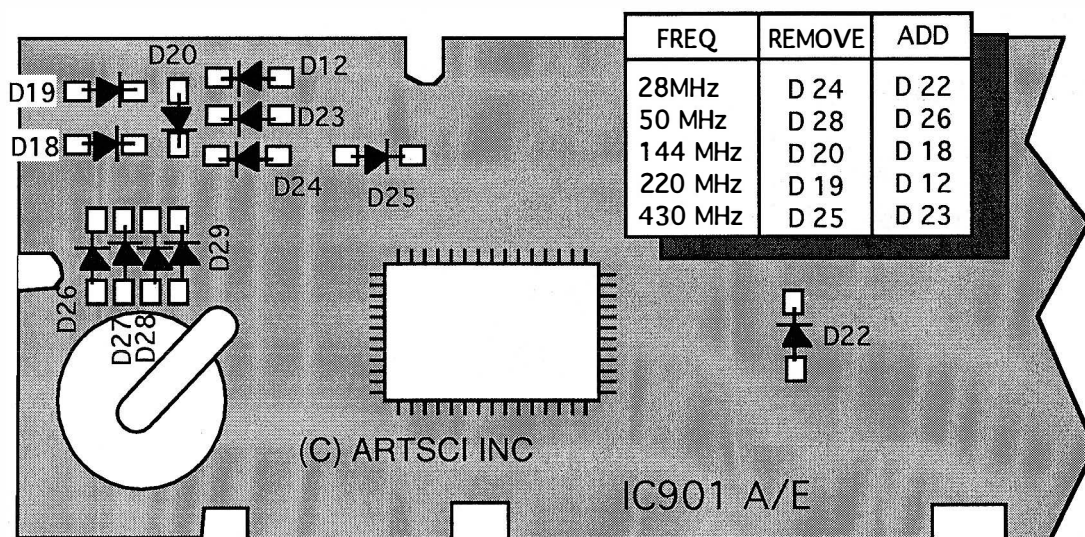
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ICOM IC-901A

EXPANDED RF - CROSS BAND REPEATER

1. Remove control head Cable.
2. Remove screws and open "control head" case.
3. Located and **remove diodes D24, D28, D20, D19 and D25.**
4. Attach diodes **D22, D26, D18 D12, D23.**
5. **Remove Diode D27** (Cross band repeater mod).
6. Reassemble control head.
7. **Reset the microprocessor** (Turn radio on and press [CHECK] & [MW].



Mic Gain Adjustment: Adjust R70 in the Logic A Unit.

TO ACTIVATE CROSS BAND REPEATER MODE:

1. Turn the power off.
2. Push and hold [CHECK] and [LOCK] and turn power on.

TO DEACTIVATE CROSS BAND REPEATER MODE:

1. PRESS [LOCK] BUTTON.

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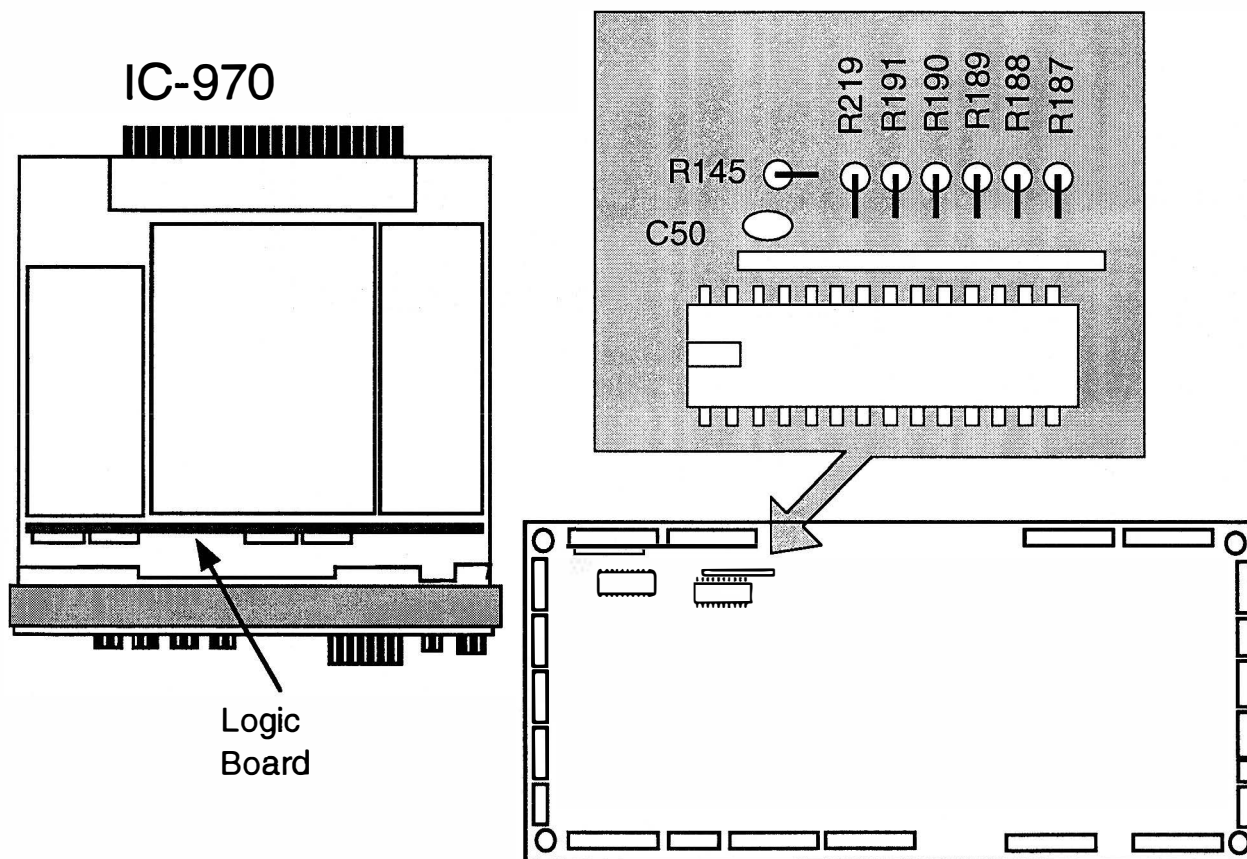
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ICOM IC-970

EXPANDED RF

1. Remove power and antenna.
2. Remove top and bottom covers.
3. Locate and expose the logic board. (see drawing)
4. Locate and **cut resistor R187**.
5. Locate and **cut resistor R190**.
6. Locate and **cut resistor R219**.
7. Locate and **cut resistor R191**. (XBand Repeater Mod)
8. **Locate resistor position R 188 and add a 10K ohm resistor.**
9. Reassemble the radio.
10. **Reset the microprocessor.** (Push and hold [MW] and turn power on).



Cross Band Procedure:

- 1) Set the MAIN & SUB Frequencies.
- 2) Turn Radio off.
- 3) Press [LOCK] switch ON.
- 4) Press and hold [FUNCTION] & [M/S] switch and turn on.
- 5) TO CANCEL REPEATER FUNCTION - Turn the [LOCK] switch off.



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Performance Report

Radio _____

Date _____

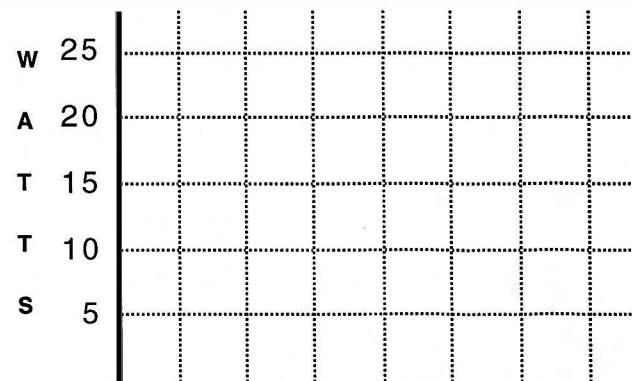
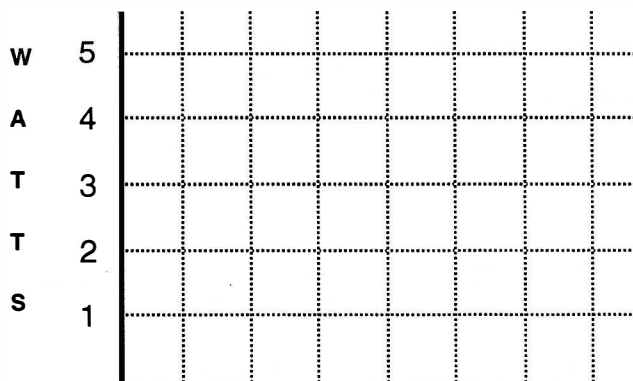
Owner : Name _____

Address _____

City _____ St. _____ Zip _____

Phone () - _____

Description	Before	After
Power out (Low)	_____ Watts	_____ Watts
Power out (High)	_____ Watts	_____ Watts
Frequency Error (Simplex)	_____ Hz	_____ Hz
Frequency Error (Offset)	_____ Hz	_____ Hz
Receive Sensitivity (Mid-band)	_____ uv	_____ uv
Receive Sensitivity (_____ MHz)	_____ uv	_____ uv
Receive Sensitivity (_____ MHz)	_____ uv	_____ uv
PL Deviation	_____ Hz	_____ Hz
DTMF Deviation	_____ KHz	_____ KHz
Audio Deviation	_____ KHz	_____ KHz
Lowest usable Freq @ .5 Pwr	_____ MHz	_____ MHz
Highest usable Freq @ .5 Pwr	_____ MHz	_____ MHz



ICOM IC-1200

EXPANDED RF 870-960 MHz

1. Remove Power and Antenna.
2. Remove screws open case.
3. Locate and **cut Resistor R52** on Logic A unit.
4. **Install a new antenna connector** to position J2 on RF board.

Note: a different antenna is required for the 870-960 bands

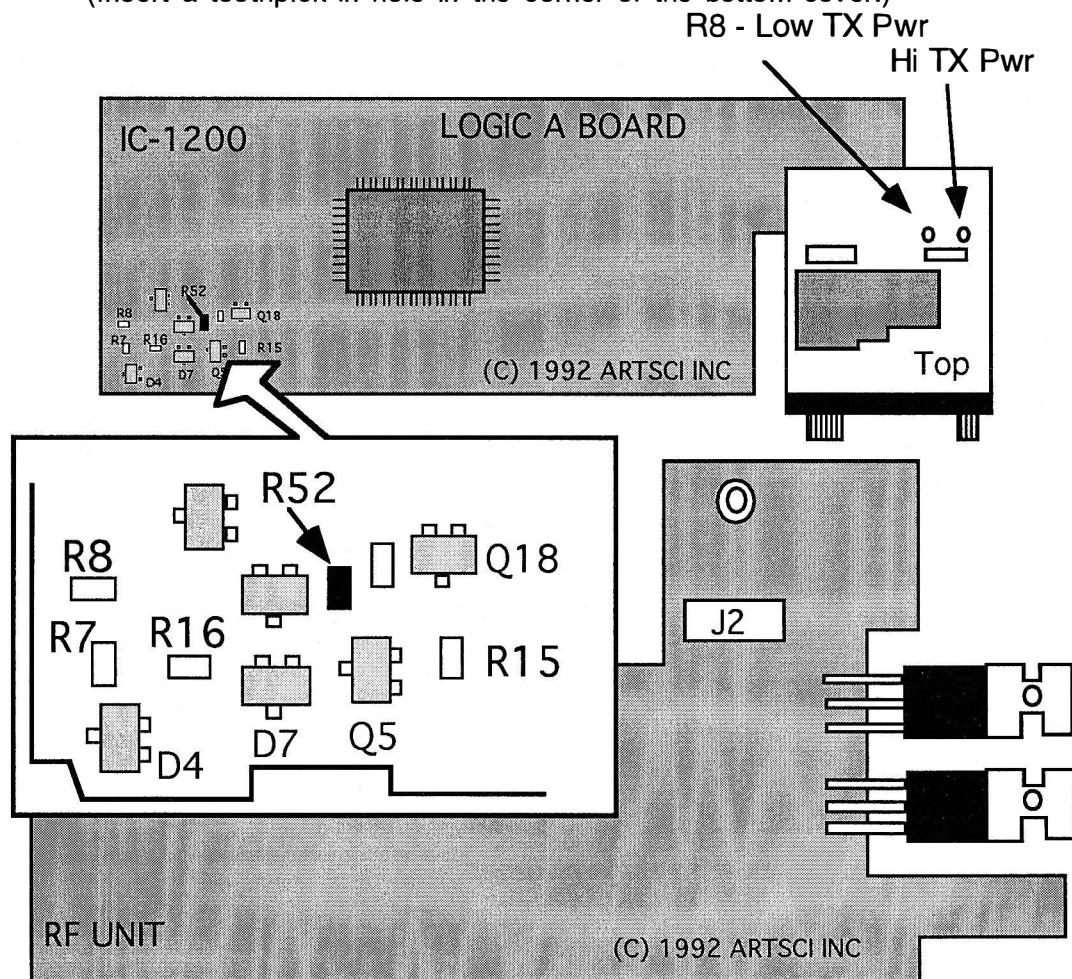
5. Reassemble the radio.

6. Reset the microprocessor.

(Hold down the tuning control and turn the power on)

or

(Insert a toothpick in hole in the corner of the bottom cover.)



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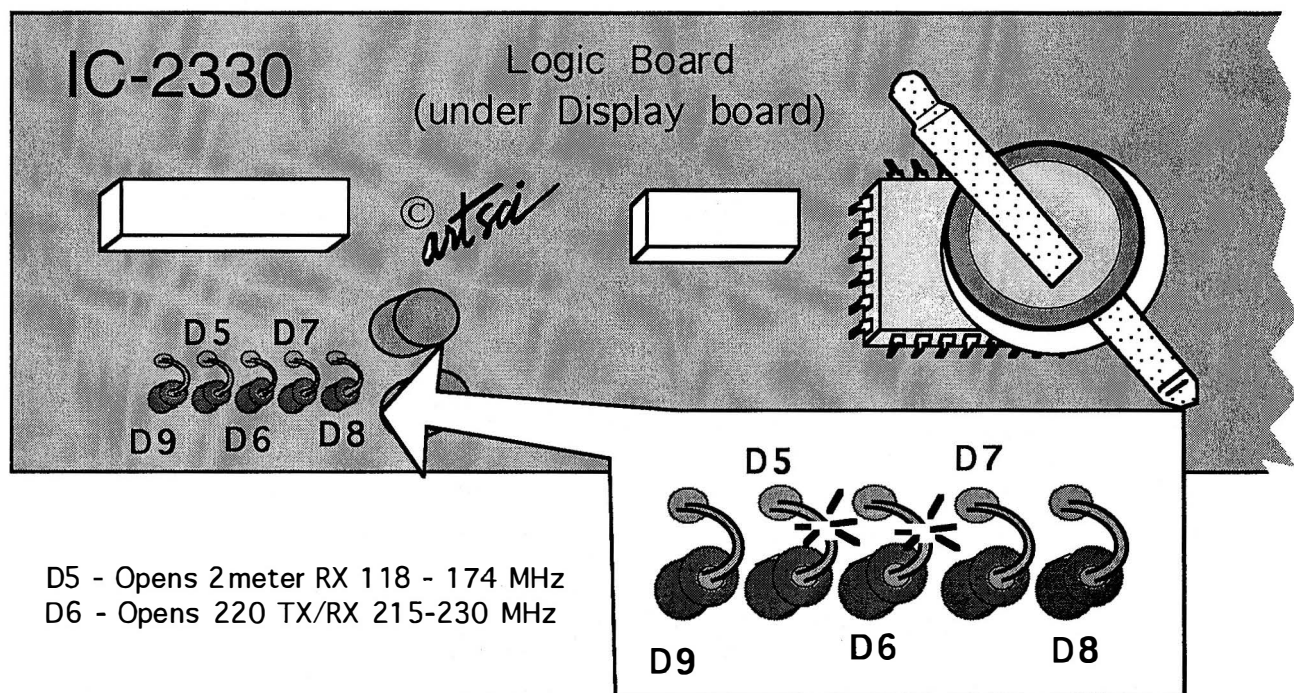
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ICOM IC-2330

EXPANDED RF (118 - 174 RX, 215 - 230 TX/RX)

1. Remove Power and Antenna.
2. Remove screws open case.
3. Locate Logic Board. (on the front of the radio under display)
4. Locate and cut Diodes D5 & D6
5. Reassemble the radio
6. Reset the Microprocessor if needed.



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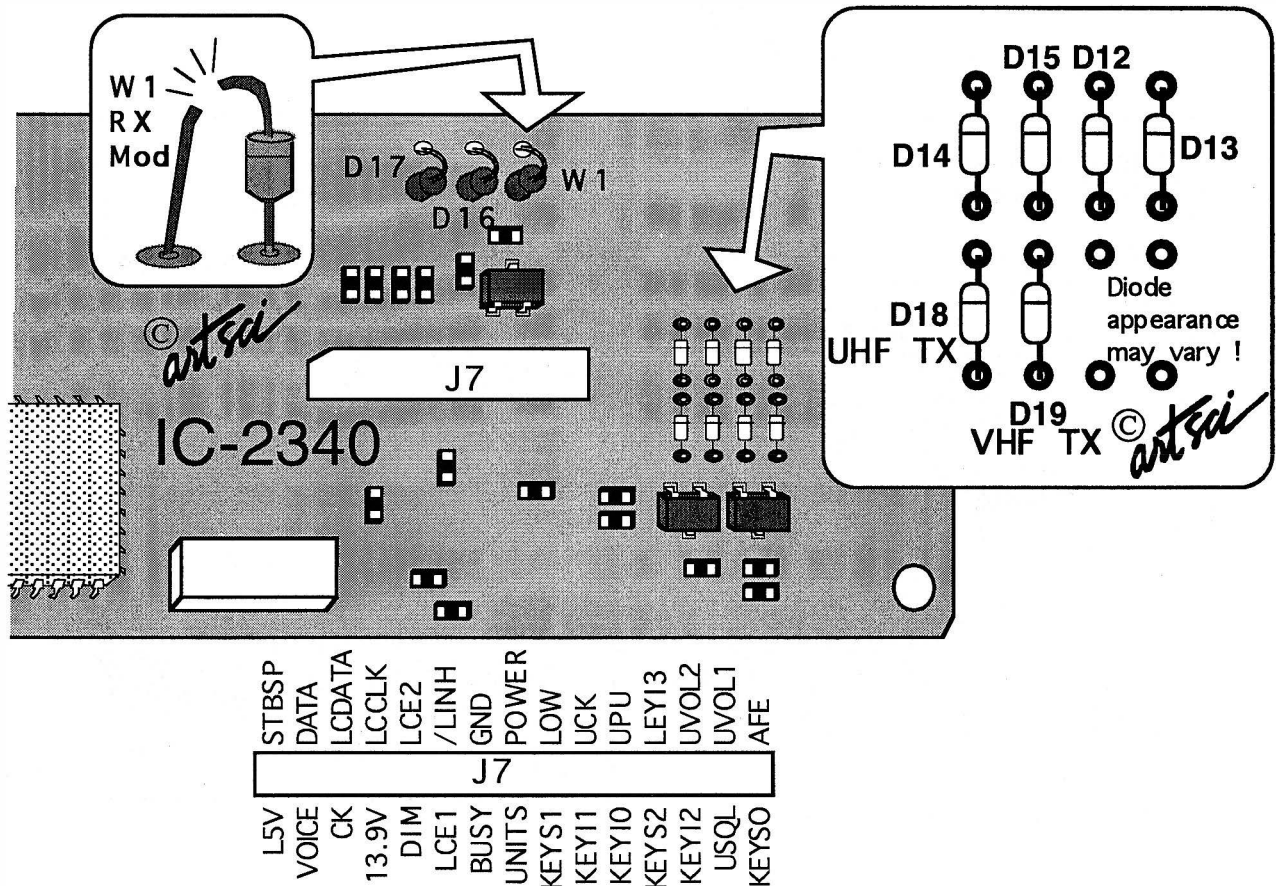
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ICOM IC-2340

EXPANDED RF

1. Remove Power and Antenna.
2. Remove screws open case.
3. Locate Logic Board.
4. Locate and cut W1 (Extended Receive)
5. Locate and remove diode D19 (Extended TX on VHF)
6. Locate and remove diode D18 (Extended TX on UHF)
7. Reassemble radio.



X-Band Repeater:

Set Desired Frequencies on each band

Press [VHF Main] & [UHF Main] & [SET] at the same time. (memory indicator will change to "L")

EXIT: Press [SET] for 1 second.



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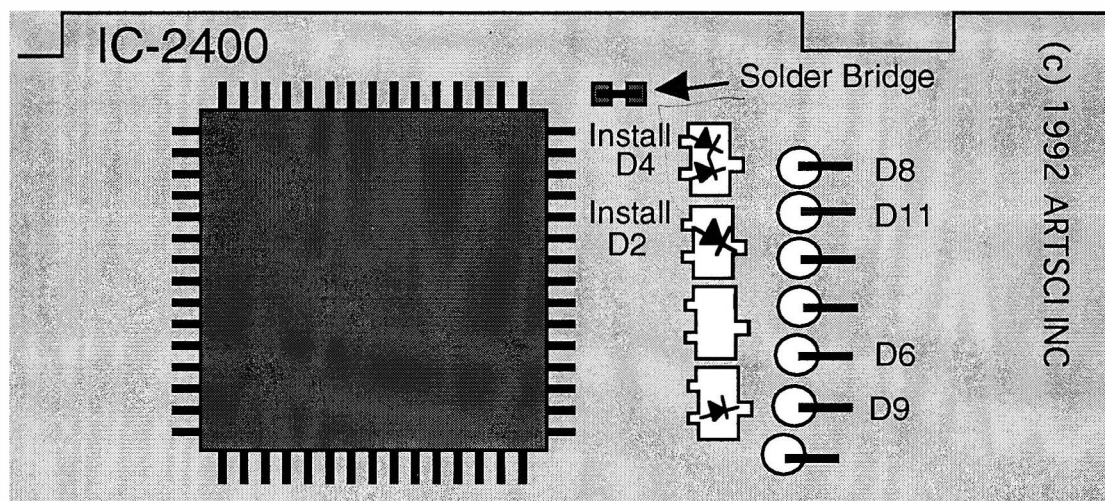
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ICOM IC-2400

EXPANDED RF / CROSS BAND REPEATER

1. Remove battery and antenna.
2. Remove screws open case.
3. **Locate and cut diode D5.** (440 Mod)
4. **Locate and cut diode D6.**(440 Mod)
5. **Install chip diode .** (see drawing)(440 Mod)
6. **Locate and cut diode D11.** (2 Meter mod)
7. **Locate and cut diode D8.** (2 Meter mod)
8. **Install chip diode. D4** (1SS184 B3)
9. **Install chip diode. D2** (1SS193 F3)
10. **Solder jump pads.**
11. Locate and **cut D9.** (Repeater Mod)
12. Reassemble the radio.
13. **Reset the microprocessor.** (Press and hold [SUB VOL] & [MW] and turn power on)



CROSS BAND REPEATER PROCEDURES

TURN ON - Push and hold [SET], [MONI] & [MHZ] & Mic down Button and turn power on.

TURN OFF - Push and hold [SET] then press [MHZ]

MORE ----

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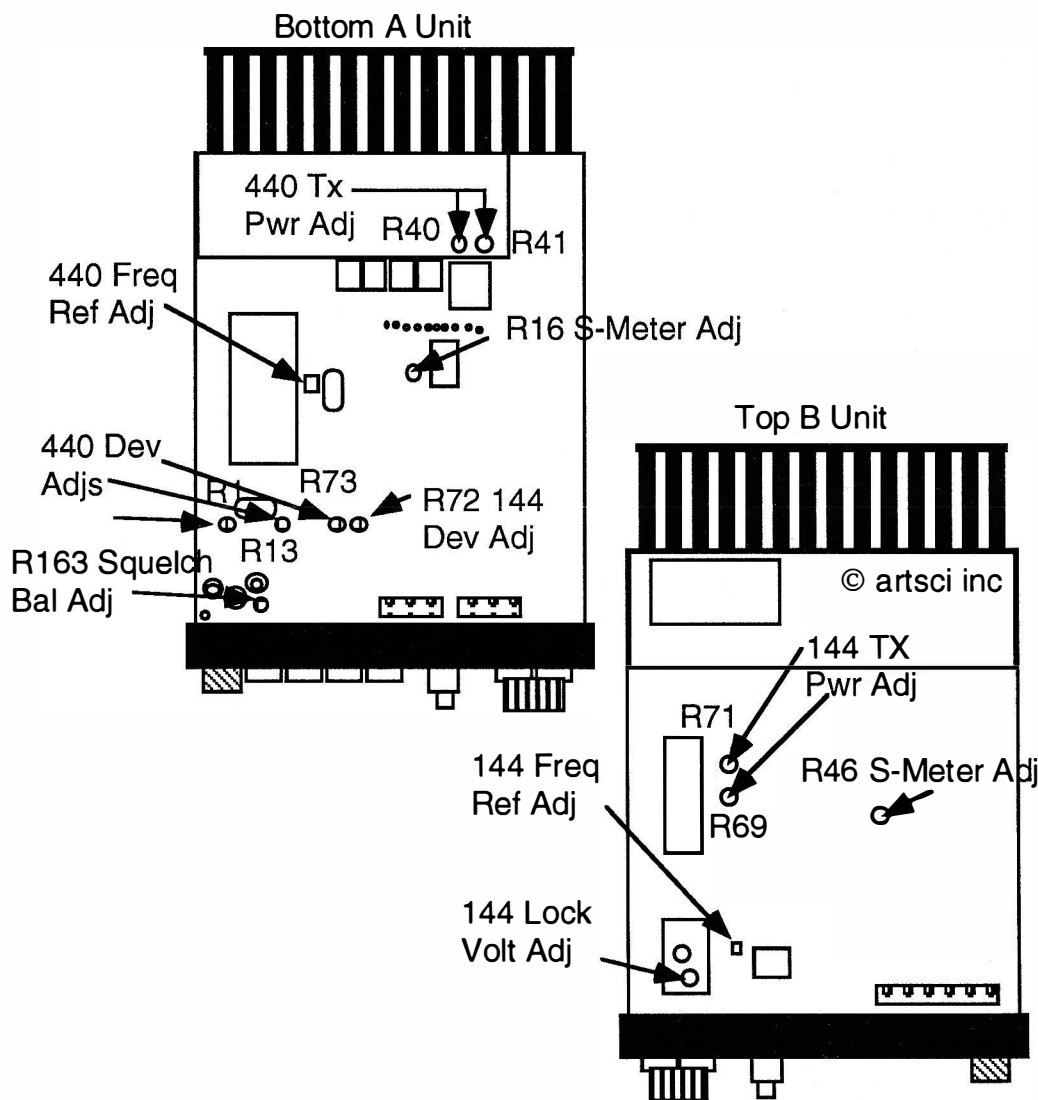
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ICOM IC-2400

ALIGNMENT POINTS

IC-2400A/E



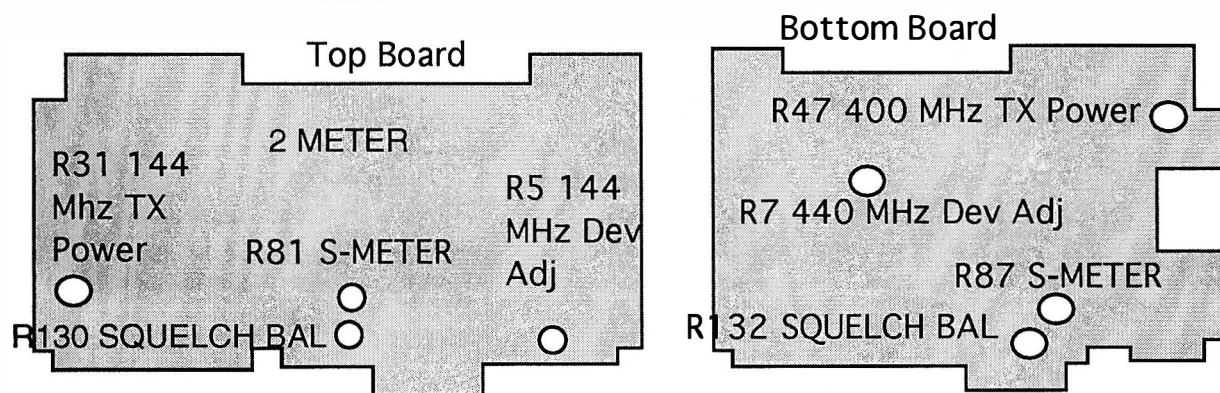
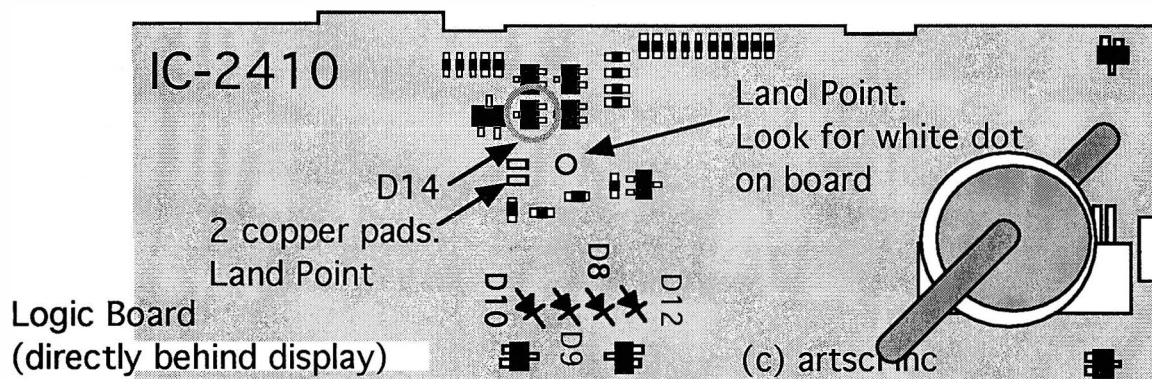
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ICOM IC-2410

EXPANDED RF

1. Remove power and antenna.
2. Remove screws open top and bottom case. (two on each top and 4 on each side)
3. Remove the 4 screws in the metal frame holding the front panel and pull the front face away from the radio.
4. Locate and **cut diode D9** on logic board. (VHF Rx mod 118 - 136 MHz)
5. Locate and **cut diode D10**. (UHF R Mod 440 - 479 MHz)
6. Locate and **cut diode D8**. (320-399 MHz & 830-950 Rx Mod)
 Note: An antenna cable is required for 830-950 MHz range. Use Jack J2 on main board B to connect an antenna cable.
7. Locate and **solder jump 'LAND' point** (two copper pads) on logic board. (VHF Tx mod)
8. Locate diode D14 on logic board.
9. **Replace D14 with a 1SS181 diode.** (UHF Tx mod)
10. **Install a type "N" coax pigtail** (ICOM part OPC-166) to Connector J2 on 900 MHz IF strip. You will need a 5 3/4" gray coax jumper.
 (Be sure to route the Pigtail through the antenna connectors in the rear panel).
14. Reassemble the radio.



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ICOM IC-2410

SPECIAL FUNCTIONS

MINI REPEATER FUNCTION.

ACTIVATION

1. Set VHF & UHF Frequency. Offset and tone can be programmed in.
2. Press and Hold [BAND] & [SET] switch.
The Memory number indicator will blink an "L" symbol.

NOTE: The microphone PTT will operational. Use the [UP] & [DOWN] keys to elect the transmitting band. A flashing decimal point will appear on the selected band.

CANCELLATION

1. Press and hold the [SET] button until the memory "number" display appears.

VOICE ANSWER BACK FUNCTION (Optional UT-66 & UT-55 are required)

1. Switch on the SUB BAND remote mode. (see user manual)
2. Send remote control code "D" & "C" . (Control is on the sub band frequency)
The operating frequency of the main band will be announced.

SPECIAL COMMANDS

ENTER REMOTE DTMF MODE	Send "B" PASSWORD "#" Default is B000#
EXIT DTMF REMOTE MODE	Send "B" PASSWORD "*" Default is B000*
XBAND REPEATER ON	Press [BAND] & [SET] until flashing "L" appears
XBAND REPEATER OFF	Press [SET] until memory # appears.
REMOTE XBAND ON	Send "D" "B" "*" on remote DTMF keypad.
REMOTE XBAND OFF	Send "B" "PASSWORD" "#" Default is B000#
REMOTE VOICE READBACK	Send "D" "C" on remote DTMF keypad.

XBAND function must be off to control all transceiver functions.



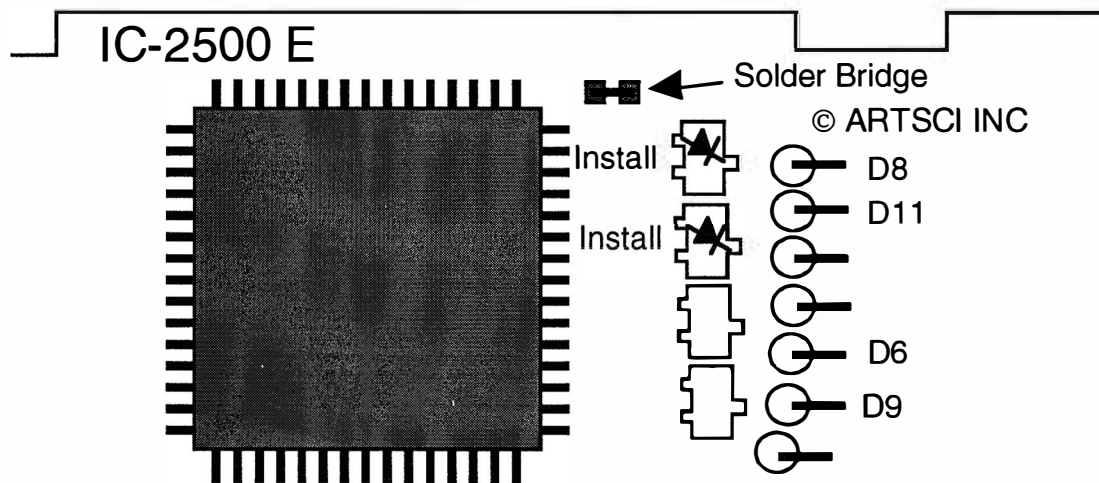
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ICOM IC-2500

EXPANDED RF / CROSS BAND REPEATER

1. Remove battery and antenna.
2. Remove screws open case.
3. Locate and **cut diode D11.** (440 Mod)
4. Locate and **cut diode D 6.**(440 Mod)
5. **Install chip diode .** (see drawing)(440 Mod)
6. Locate and **cut diode D11**
7. Locate and **cut diode D8**
8. **Install chip diode.** (see drawing)
9. Solder jump pads.
10. Locate and **cut D 9** (Repeater mod)
11. Reassemble the radio.
12. **Reset the microprocessor.** (Press and hold [SUB VOL] & [MW] and turn power on)



CROSS BAND REPEATER PROCEDURES

TURN ON - Push and hold [SET], [MONI] & [CALL] & Mic down Button and turn power on.

TURN OFF - Push and hold [SET] then press [MHZ]

MORE ----

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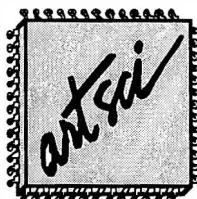
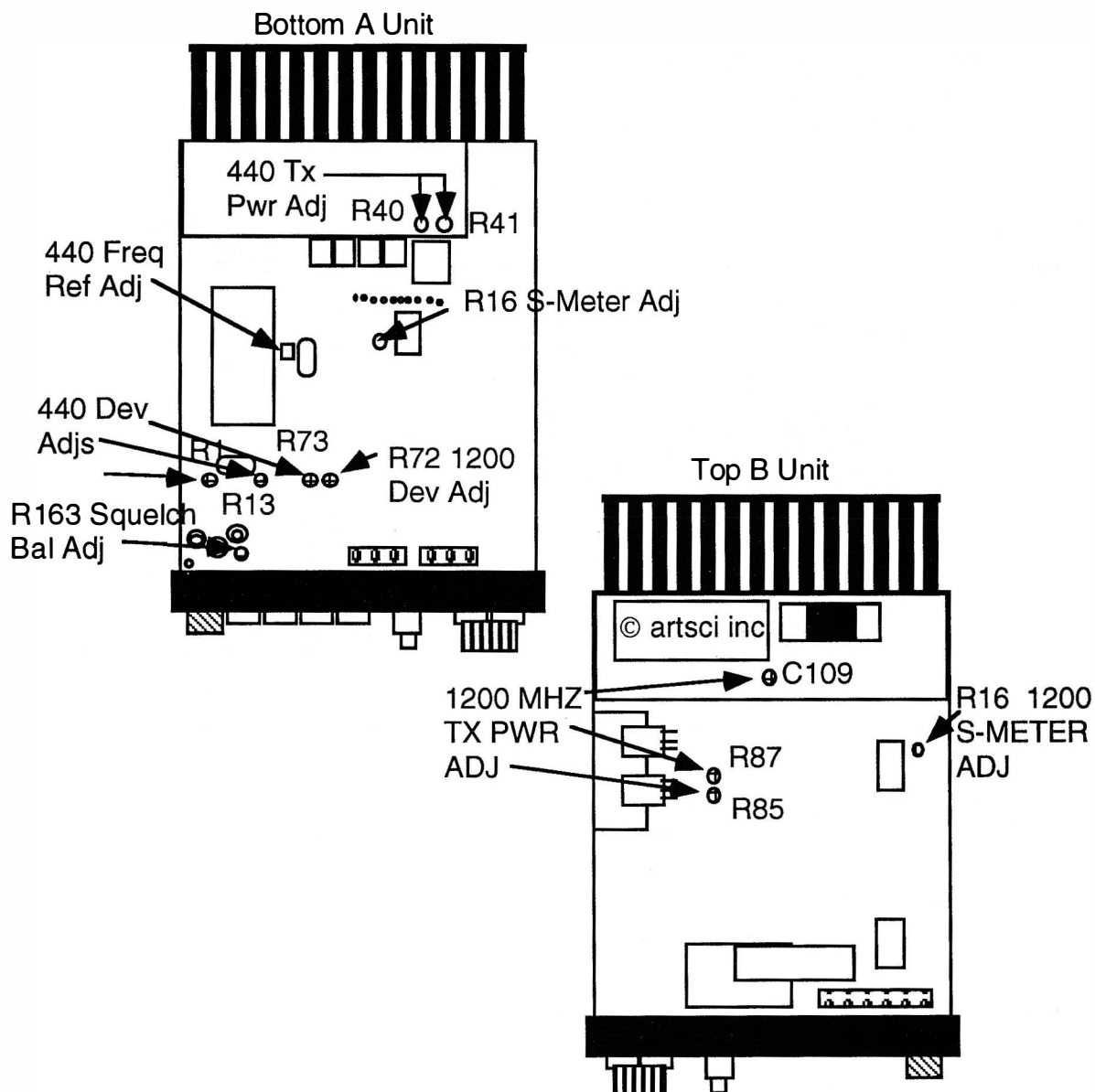
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ICOM IC-2500

ALIGNMENT POINTS

IC-2500A/E



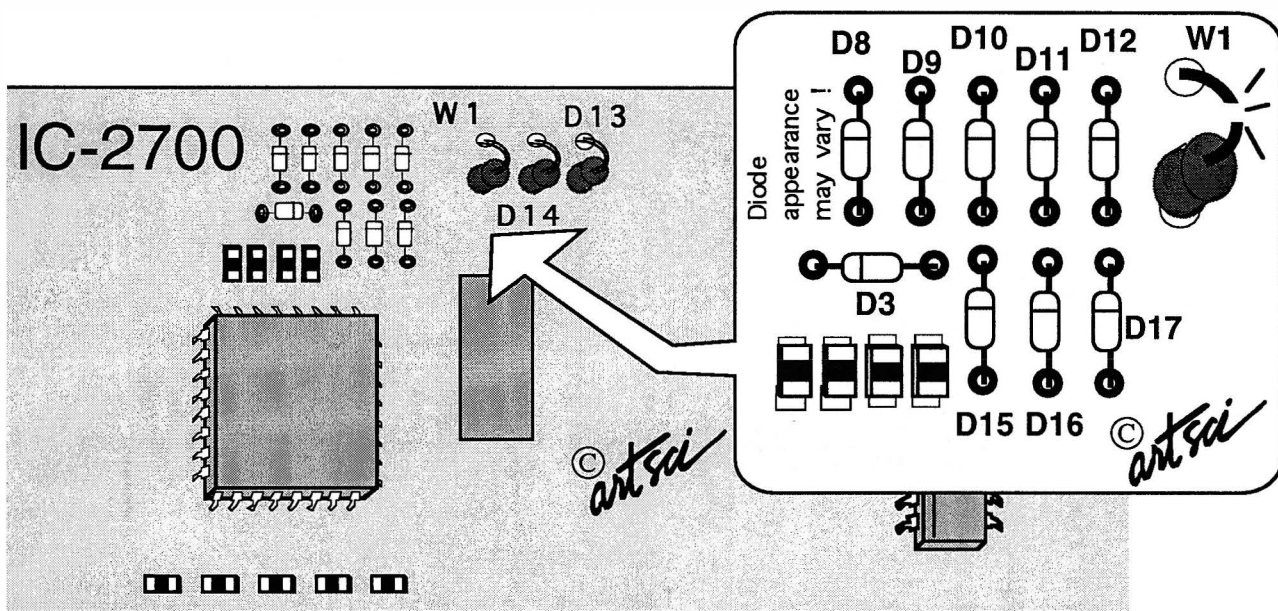
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ICOM IC-2700

EXPANDED RF

1. Remove power and antenna.
2. Remove screws open case.
3. Locate logic board.
4. Locate and **cut Jumper W1** (RX mod)
5. Locate and **remove Diode D16**. (UHF TX)
6. Locate and **remove Diode D17**. (VHF TX)
7. Reassemble the radio.
8. You may be required to reset the Microprocessor. (see owners manual)



Note: Diode D14 is not installed in USA versions. (Mini repeat enable)

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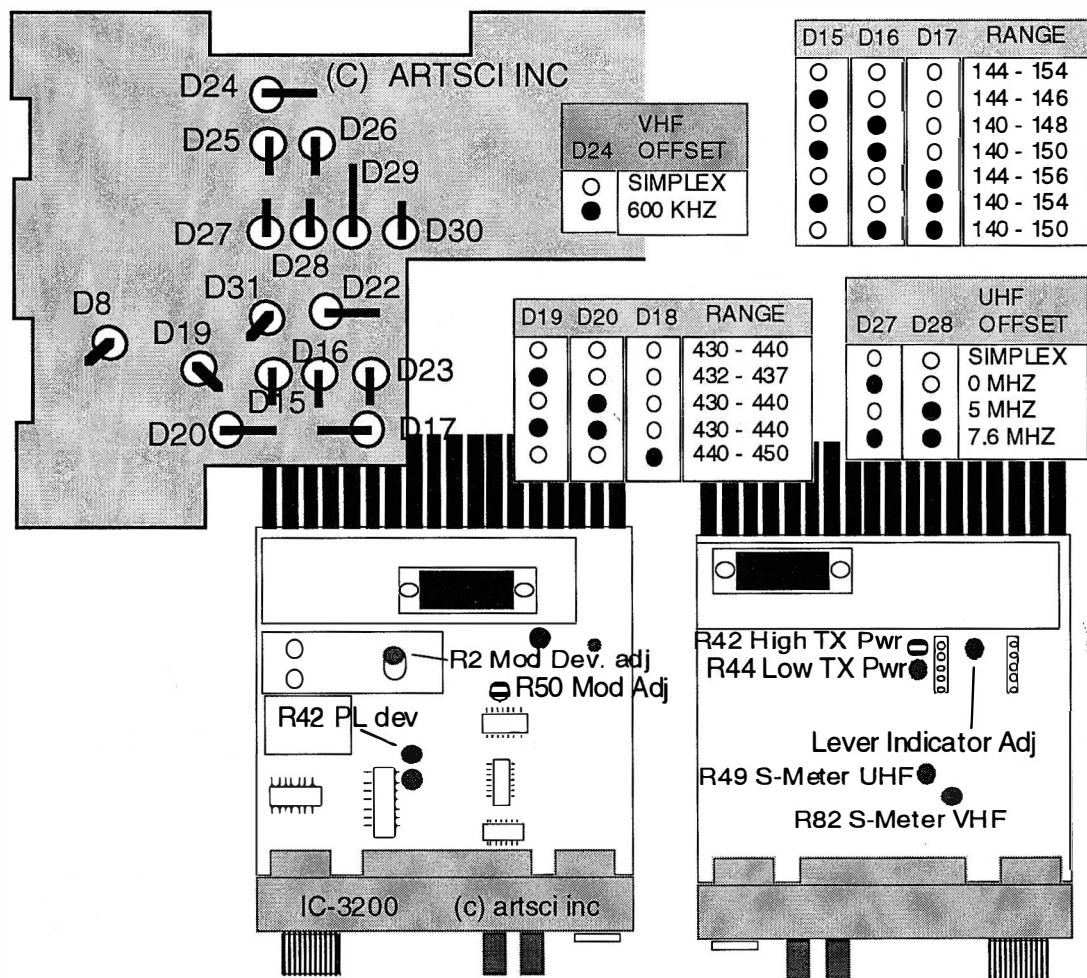
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ICOM IC-3200

EXPANDED RF / Alignment Controls

1. Remove battery and antenna.
2. Remove screws open case.
3. Locate Diode programming matrix (Control Head).
4. **Install or remove diodes** using tables below.
5. Reassemble the radio.
6. Reset the microprocessor.



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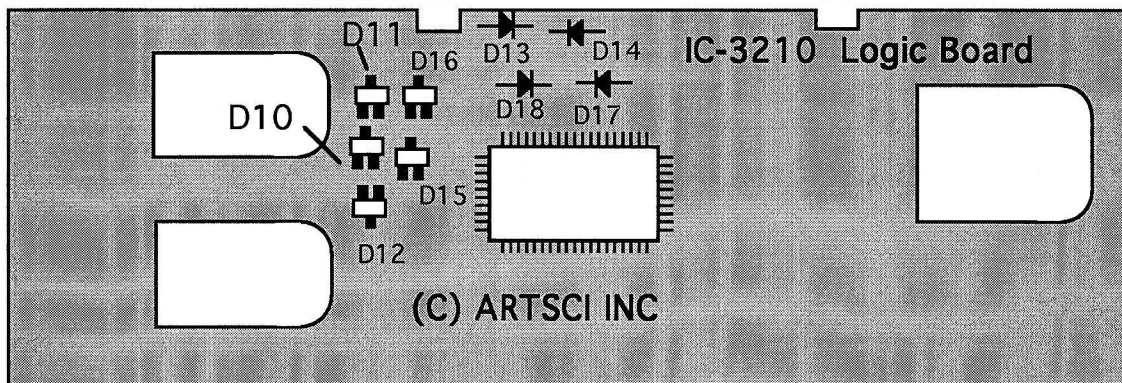
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ICOM IC-3210

EXPANDED RF / CROSS BAND REPEATER

1. Remove battery and antenna.
2. Remove screws open case.
3. Locate and **cut diode D17**. (Already removed in USA version) (144 mod)
4. **Replace chip diode D10** in position A. (New: 1SS184 B3) (144 mod)
5. Locate and **cut diode D18**. (440 mod)
6. **Replace chip diode D11** in position B (old: 1SS196 New: 1SS184 (B3))(440 mod)
7. Locate and **cut diode D14**. (Repeater mod)
8. Reassemble the radio
9. **Reset the microprocessor**. (Push and hold [SQUELCH/Monitor] & [LOCK] and turn power on)



CROSS BAND REPEATER PROCEDURES

TURN ON - Set radio to "SPT mode". Push and hold "Band switch & "Lock switch" ("SPT" and "L" will flash)

TURN OFF - Press [LOCK] switch.

MORE ---

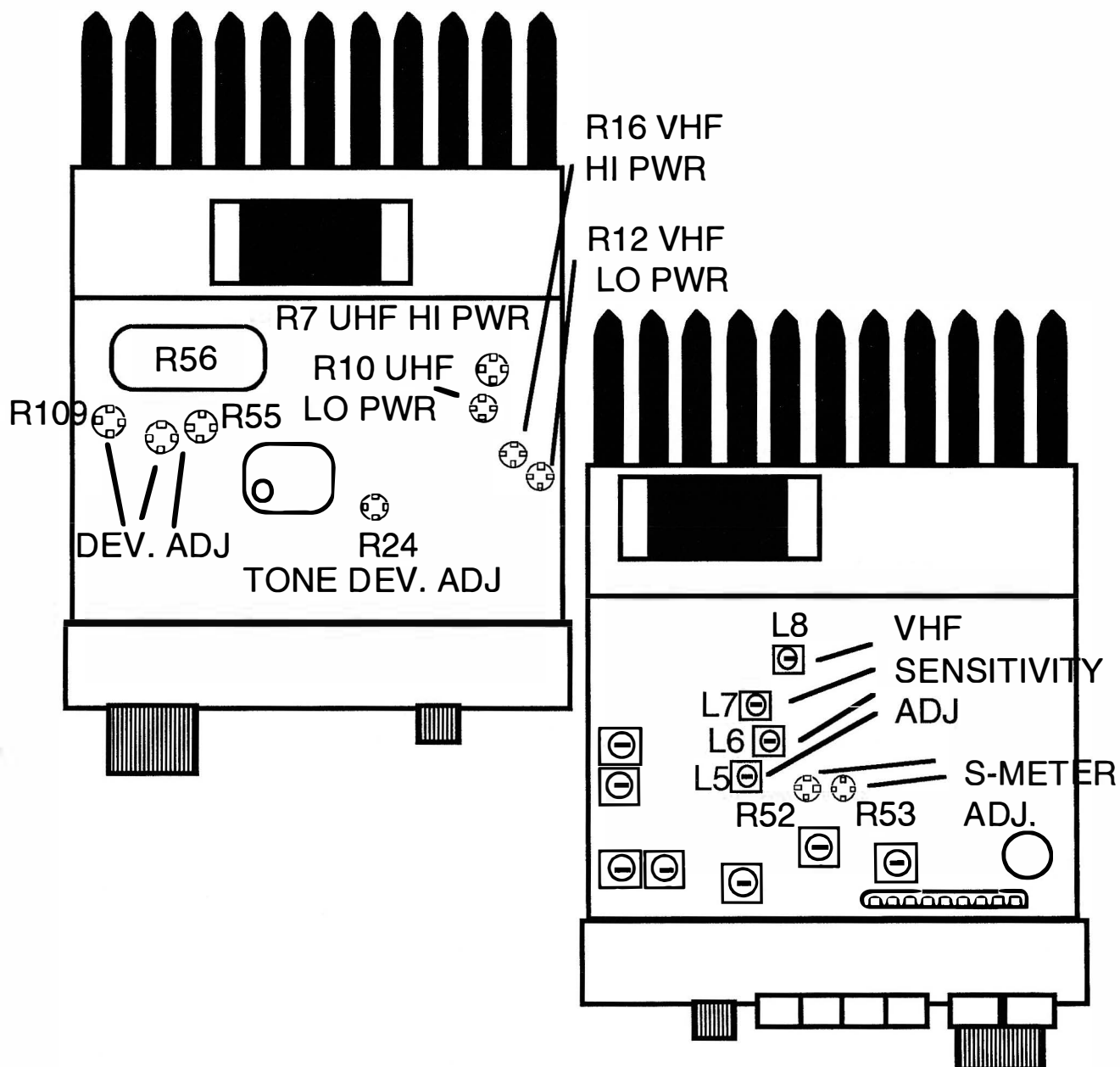
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ICOM IC-3210

ALIGNMENT CONTROLS



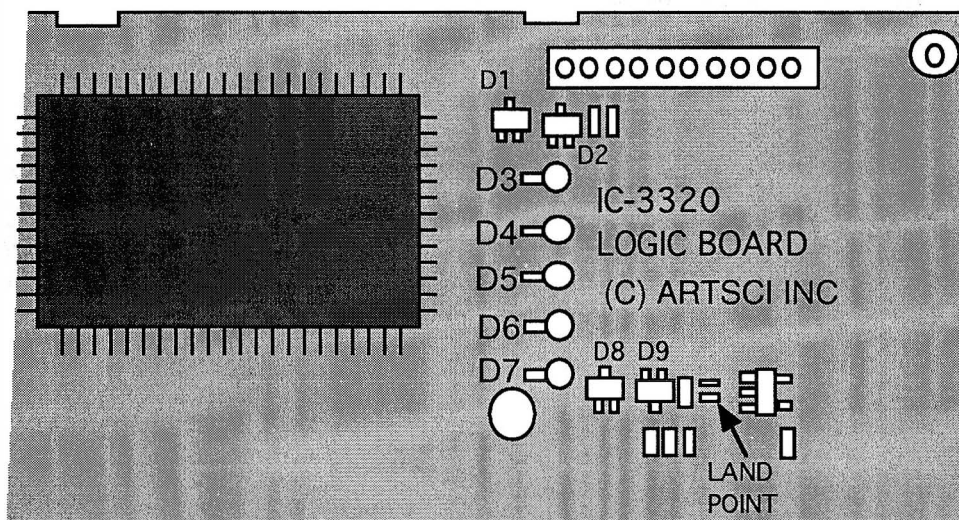
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ICOM IC-3220

EXPANDED RF & Air Craft AM

1. Remove power and antenna.
2. Remove screws open case.
3. Locate and **Cut Diode D4** on the LOGIC board. (VHF 118 -135 MHz)
4. Locate and **Cut Diode D5** on the LOGIC board. (UHF)
5. **Install a jumper at "land" point.** (VHF) Located right of D9.
6. **Install a diode (1SS181) at Location D9** on the LOGIC board.
7. Reassemble the radio
8. **Reset the microprocessor.** (Press and hold [SET] & [MW] and turn radio on)



FREQ 118.000 - 135.995 MHz (AM) RX 136.000 - 174.000 MHz (FM) RX
 136.000 - 174.000 MHz (FM) TX 440.000 - 479.000 MHz (FM) RX & TX

CROSS BAND REPEATER PROCEDURES

TURN ON - Set VHF & UHF Frequencies in DUAL WATCH mode.
 Press and hold [BAND] and press [SET]. Memory channel will show a flashing "L"

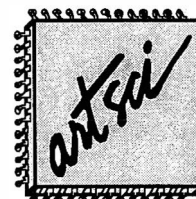
TURN OFF - Press [SET] key. Turning off the radio will not disable repeater mode.

Note: The Mic PTT will still operate the radio in repeater mode!!!

MORE ---

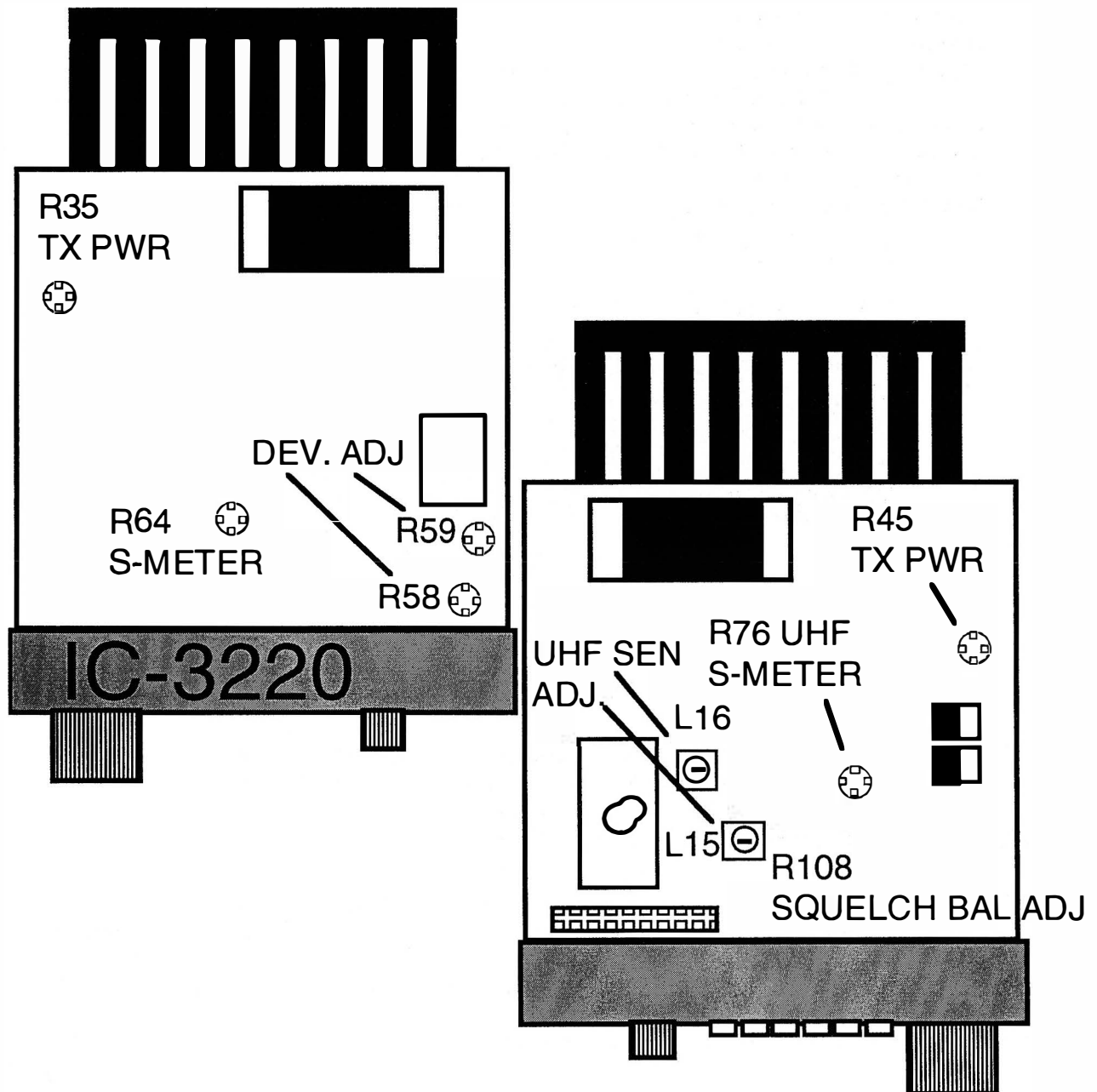
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ICOM IC-3220

ALIGNMENT CONTROLS



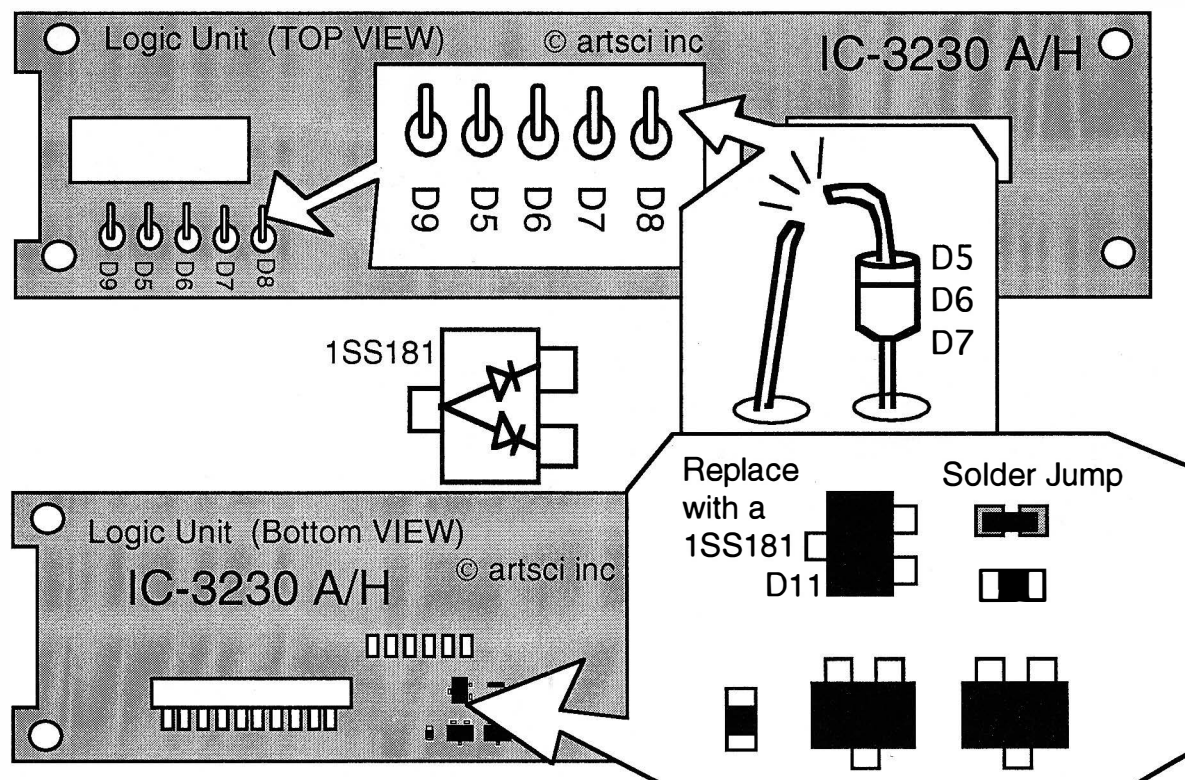
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ICOM IC-3230

EXPANDED RF

1. Remove power and antenna.
2. Remove 12 case screws
3. Remove 4 front cover screws
4. Remove 4 screws holding front frame to main frame.
5. Pull front frame out enough to access front frame.
6. Locate and **clip** D5 = 174-300 MHz RX, D6 = 118-136 MHz RX, D7 = 450-479 MHz RX
7. Unclip the two white ribbon cables attaching the logic board to the main frame.
8. **Solder jump foil pad as shown.** 118 - 174 TX mod.
9. **Replace D11 with a 1SS181 [A3].** 450-479 TX mod.
10. Reassemble the radio.



For 800MHz reception add an antenna cable to jack J1. Run the cable out the back of the radio via the extra antenna coax plug.

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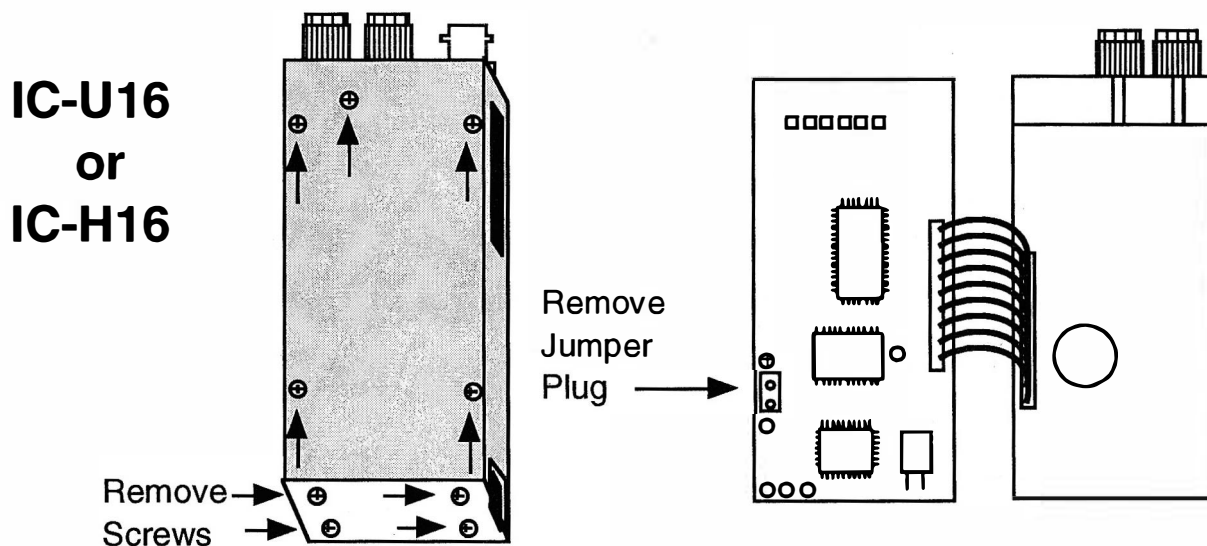
ICOM H16

USER PROGRAMMABLE MODIFICATION

1. Remove battery and antenna.
2. Remove 9 screws and open Radio.
3. Locate and remove Jumper plug.
4. Reassemble the radio.

Programming commands:

- 1) Hold down [FUNCTION] key and press [1] [5] [9] [3] [5] [7].
- 2) Hold down [FUNCTION] and press :
 - [1] - Transmit PL tone. (2 digits)
 - [2] - Receive PL Tone. (2 digits)
 - [4] - Offset in MHz. (i.e.. +05000 =+5 MHz)
 - [5] - Frequency.
 - [7] - Rename Ch#
 - [8] - Time out Timer
 - [9] - TX Inhibit
- 3) Enter #'s and press [ENTER].
- 4) To Exit Programming mode Hold [FUNCTION] and press [CLR].



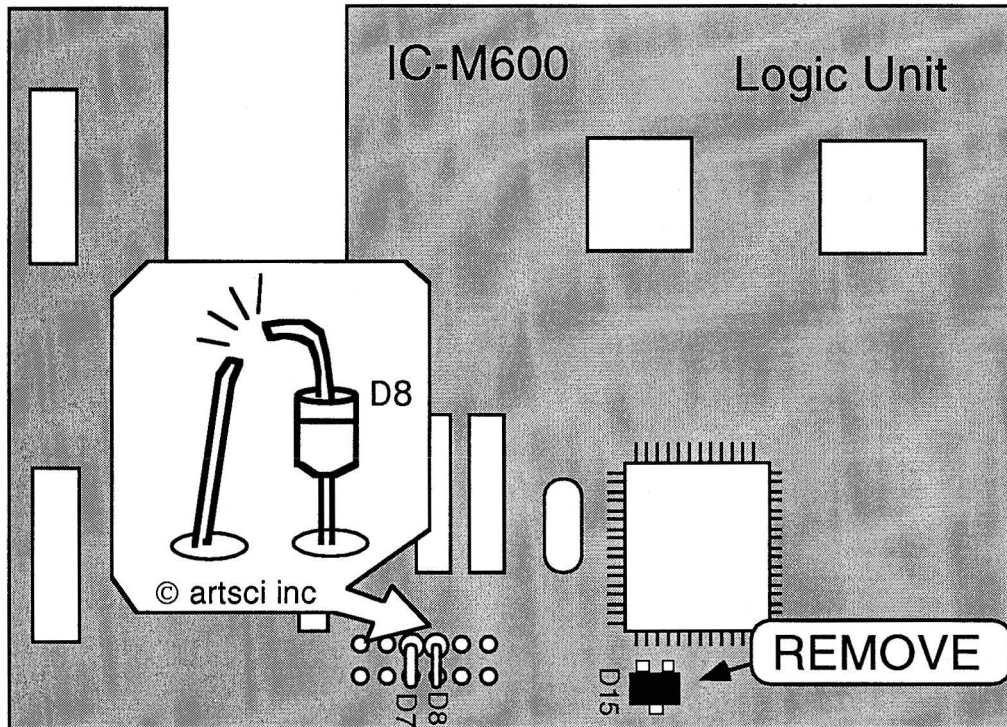
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ICOM IC-M600

EXPANDED RF / LSB ACCESS

1. Remove power and antenna.
2. Open radio and find LOGIC unit.
3. Locate and **cut Diode D8**.
4. Locate and **remove D15**.
5. Reassemble the radio.



LSB Mode

1. Press and hold [MODE] button and turn power on.
2. Select LSB mode with Mode button.
3. Press [RX] button
4. Press [TX] button
5. Turn the radio off

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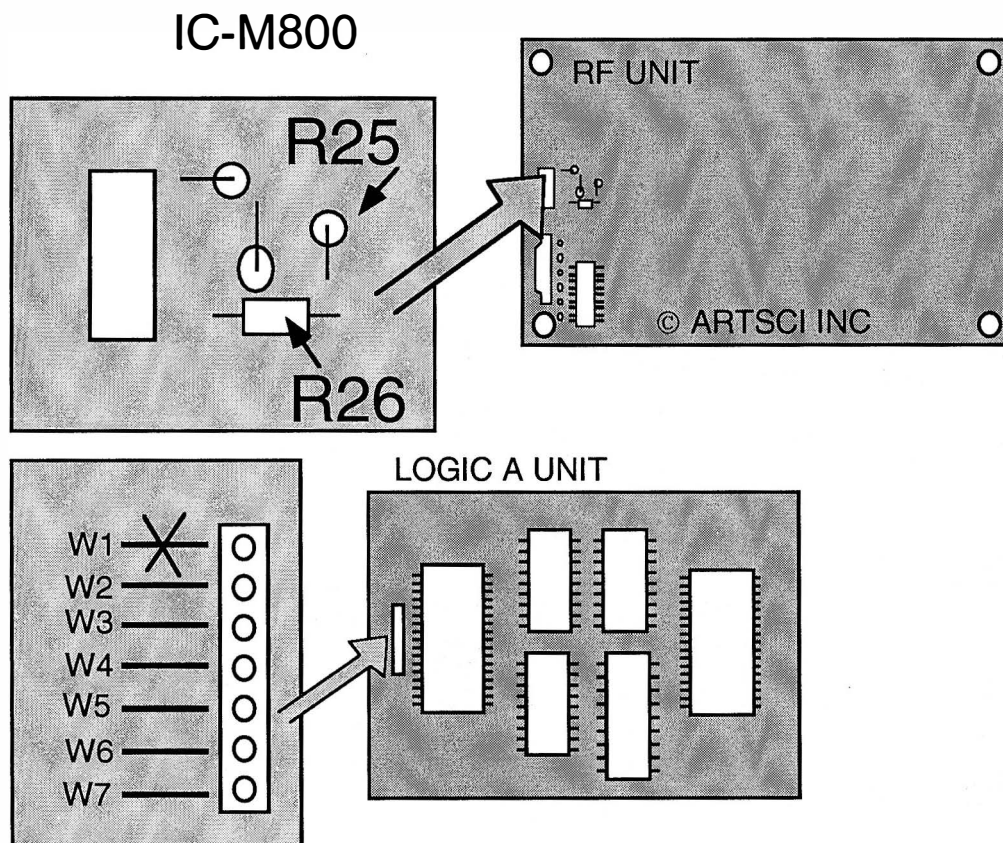
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ICOM IC-M800

EXPANDED RF

1. Remove power and antenna.
2. Open radio and find RF unit.
3. Locate and **cut Resistor R25 & R26**.
4. Locate Logic A unit.
5. Locate and **cut jumper W1**.
6. Reassemble the radio.



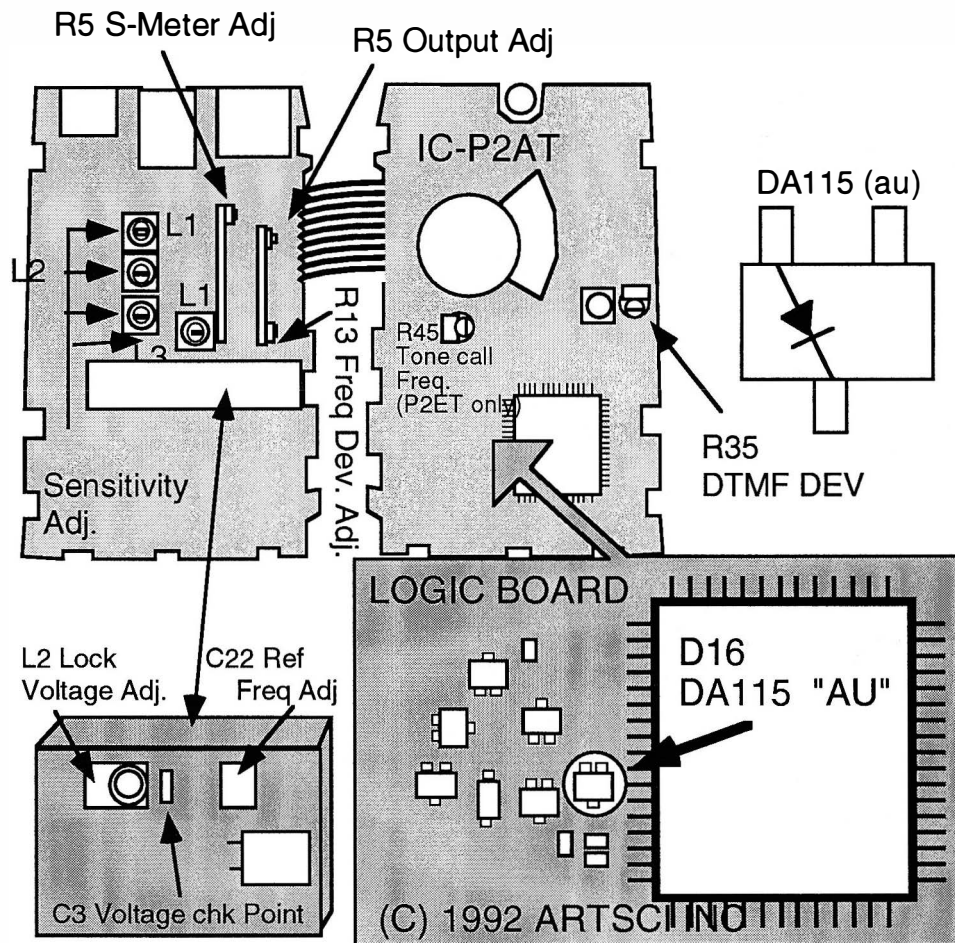
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ICOM IC-P2AT

EXPANDED RF /ALIGNMENT CONTROLS

1. Remove battery and antenna.
2. Remove screws and open radio.
3. **Install Diode D16** (symbol AU, DA115) (see drawing).
4. Reassemble radio.
5. **Reset Microprocessor.** (Press and hold [FUNC] and [V/M] and turn on. Wait for display to normalize before releasing buttons)



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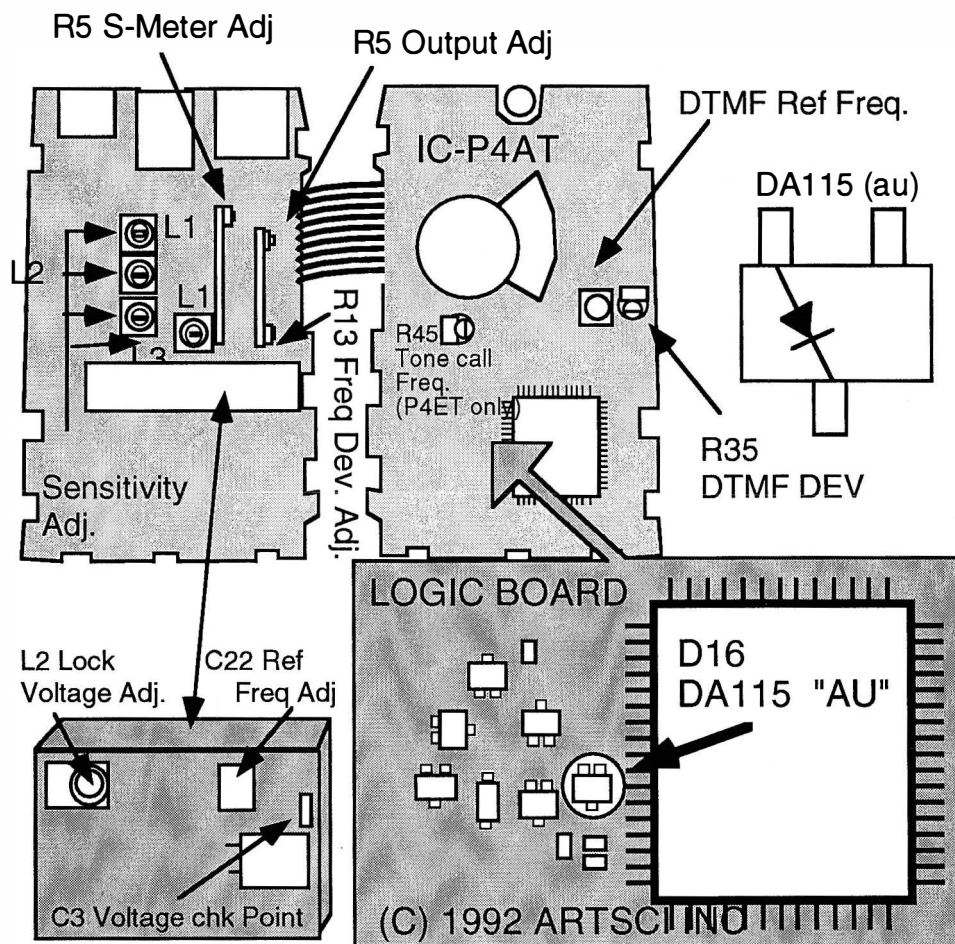
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ICOM IC-P4AT

EXPANDED RF

1. Remove battery and antenna.
2. Remove screws and open radio.
3. **Install Diode D16** (DA115 symbol AU) (see drawing).
4. Reassemble radio.
5. **Reset Microprocessor.** (Press and hold [FUNC] and [V/M] and turn on. Wait for display to normalize before releasing buttons)



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ICOM IC-R71

EXPANDED RF Receive down to 5 kHz.

1. Enter the memory channel mode and select any memory channel.
2. Push the [FUNCTION] key and [CLEAR MEMORY] button.
3. Tune (rock) memory channel knob and the main dial at the same time.
Keep rocking both until frequency display goes to 00.00.
4. Tune UP only! If you tune down the display will return to 96 kHz.

Display Failure

Replace the following components:

C14 = 33 μ 16v.
C20 = 10 μ 16v.
C15 = 4.7 μ 25v.
C17 = 3.3 μ 50v.
C18 = 0.1 μ 50v.
C21 = 10 μ 16v.
C19 = 10 μ 16v.
C22 = 10 μ 16v.
C16 = 3.3 μ 50V.

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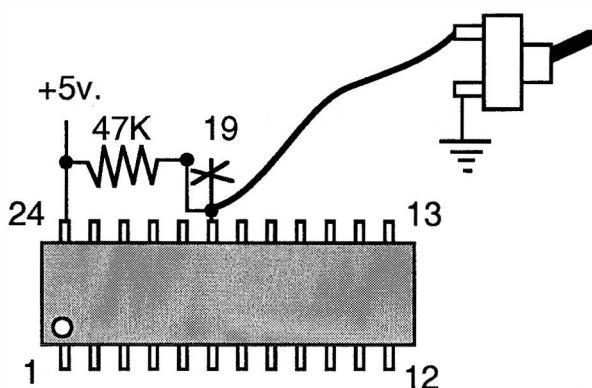
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ICOM IC-R7000

100 MORE MEMORY CHANNELS

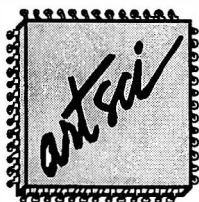
1. Remove power and antenna.
2. Remove screws and open case.
3. Locate the logic board.
4. Locate pin 19 on IC-8.
5. **Cut foil trace** to ground.
6. **Attach a 47K Ohm resistor and a switch** as shown.
7. Reassemble the radio.



Operation:

When the switch is closed, memory channels 0-99 will operate.
 When the switch is open, memory channel 100-200 will operate.

Scanning will operate in only one memory bank at a time.



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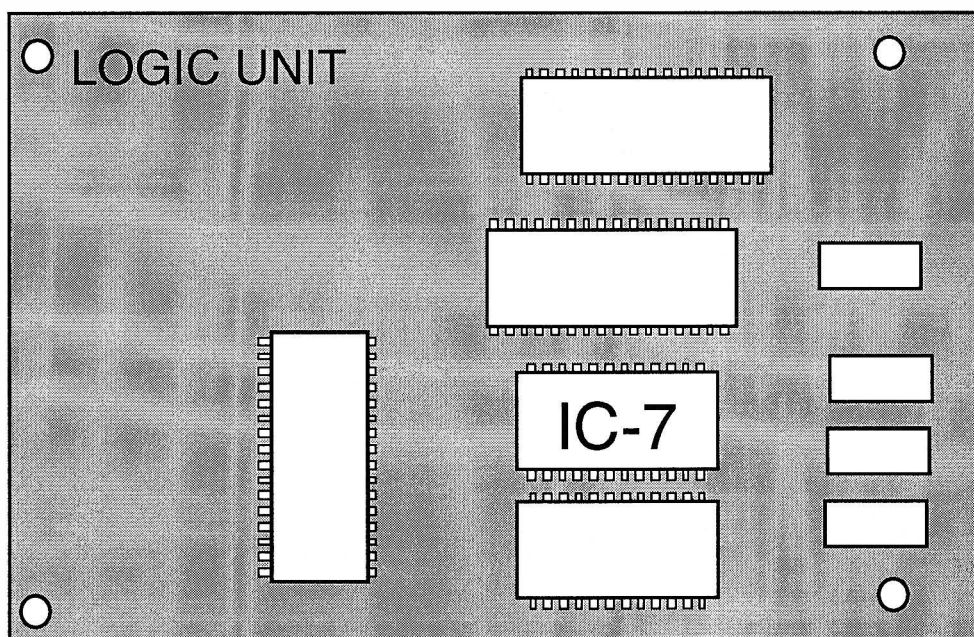
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ICOM IC-RP1220, RP1520, RP4020, RP4520

CTCSS DEFAULT MODIFICATION

1. Remove power and antennas
2. Remove bottom cover (12 screws)
3. Locate and **remove IC-7** (it is in a socket)
4. **Install a new IC-7** (Part # SC1222 ICOM Part # 900-08922)
5. Reset cover and screws.

Note: No reset is required.



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ICOM IC-S21 / IC-S41 IC-T21 / IC-T41

EXPANDED RF

T21: 108 - 136 MHz AM mode (RX only), 136 - 174 MHz FM mode (TX/RX), 400 - 490 MHz (RX)

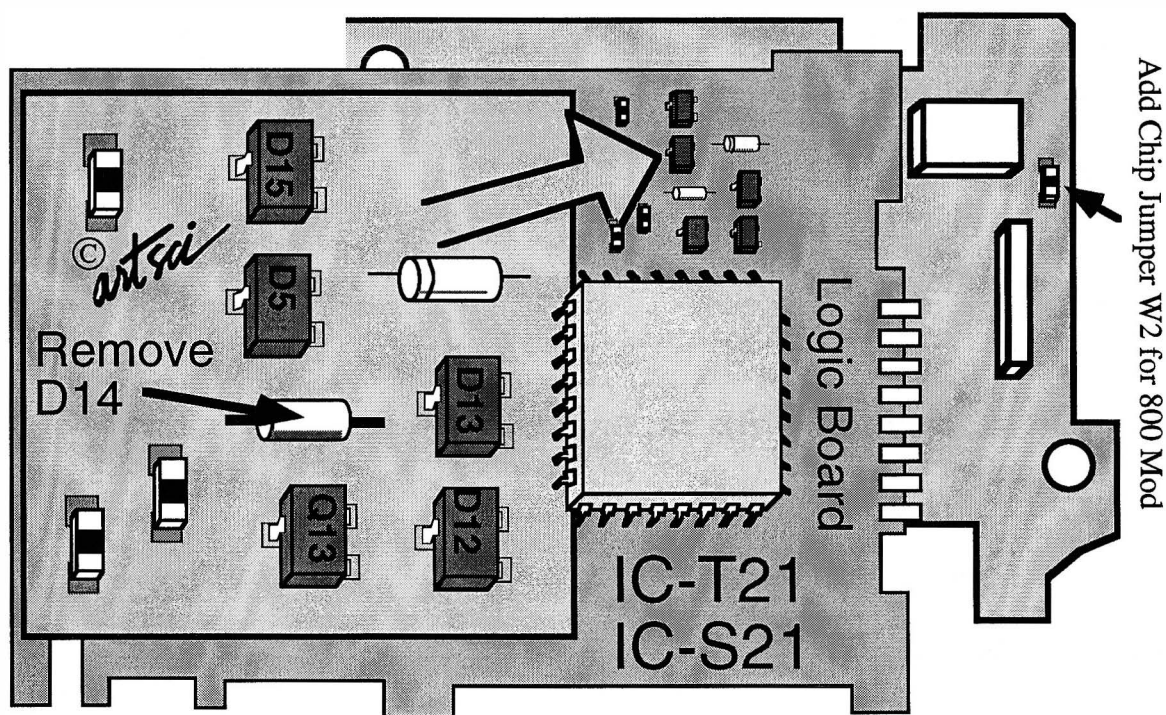
T41: 108 - 136 MHz AM mode (RX only), 136 - 174 MHz FM mode (RX), 400 - 490 MHz (TX/RX)

T21 : 108 - 136 MHz AM mode (RX only), 136 - 174 MHz FM mode (TX/RX)

T41: 400 - 490 MHz T21: **800-900 MHz (Rx only)**

1. Remove battery and antenna.
2. Open radio.
3. Locate Logic Board
4. Locate and **remove Diode D15** (RX Mod)
5. Locate and **remove Diode D14** (TX Mod)
6. Locate position W2 on UHF PLL board next to IC2 near boards edge (board # B39218)
7. Install a chip jumper in position W2 (800 Rx mod)
8. Reassemble the radio
9. T21 & T41 : **Press and hold [B] & [#] and turn power on.**
S21 & S41 : **Press and hold [MONI] & [LIGHT] & [V/M] and turn power on.**

T21 800 Mhz = In UHF select (direct entry 100) and directly enter frequency.



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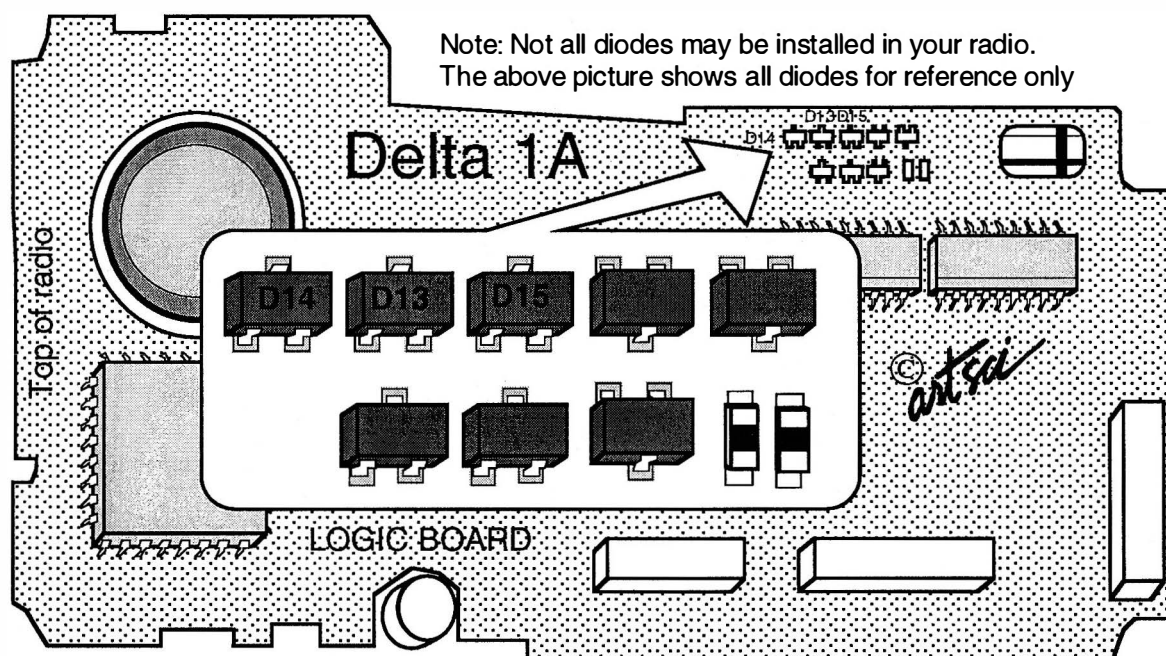
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ICOM Delta1

EXPANDED RF

118 - 136 MHz AM mode (RX only), 136 - 174 MHz FM mode (TX & RX)
 350 - 470 MHz FM mode (TX & RX), 800 - 950 MHz FM mode (RX only)
 1240 - 1300 MHz FM mode (TX & RX)

1. Remove battery and antenna.
2. Remove screws and open the radio.
3. Locate and **remove Diode D14**
4. **Replace Diode D13** with a MA132HK (ICOM part # 1790000830)
5. **Replace Diode D15** with a MA132Wk (ICOM part # 1790000850)
6. Reassemble the radio.
7. Reset the microprocessor if required. (see User Manual for RESET instructions)



OPTIONAL Keyboard Rx Expansion - Press [B] & [#] and turn radio on.

Cross Band Repeater Operation

Set radio to operate in two bands only and set desired frequencies in both bands.
 TO ACTIVATE/DEACTIVATE - Press [FUNC] & [MONI] & [ENT] at the same time.

Squelch Function - Push the [S] key and turn the Frequency set Knob for each band
 Note: The [S] key is near the PTT and [Function] switch (left side)

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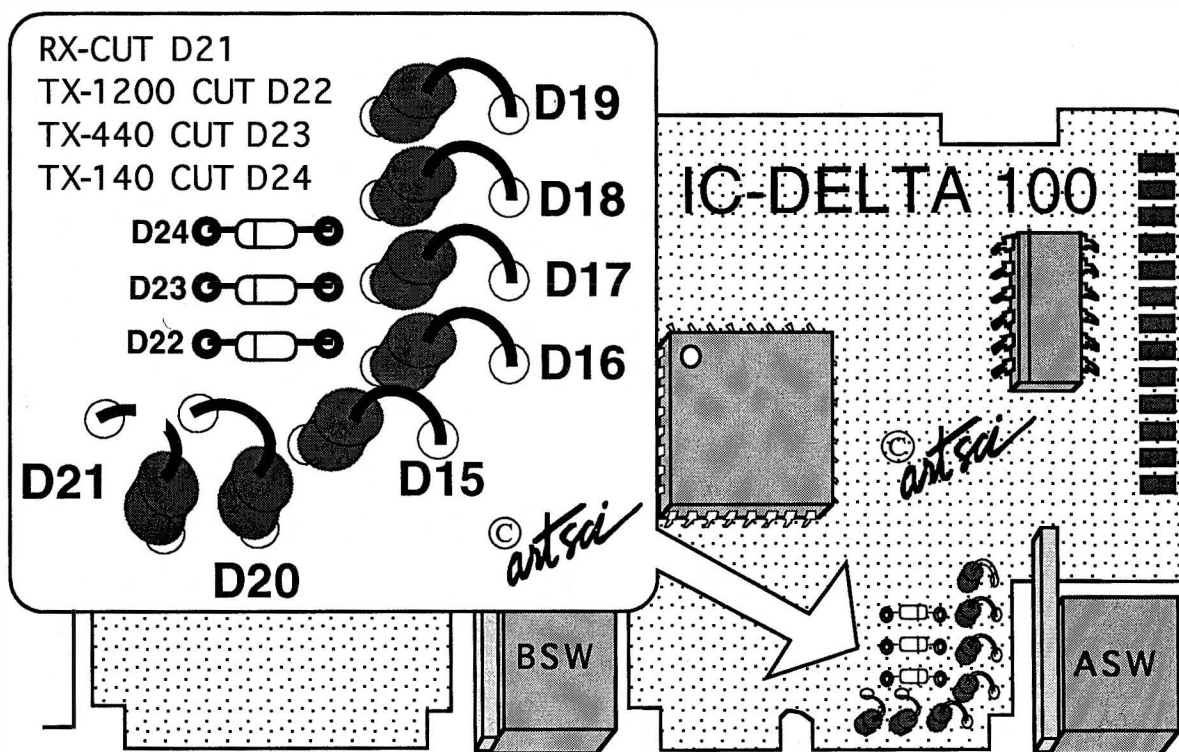


ICOM Delta 100

EXPANDED RF

118 - 136 MHz AM mode (RX only), 136 - 174 MHz FM mode (TX & RX)
 320 - 479 MHz FM mode (TX & RX), 850 - 999 MHz FM mode (RX only)
 1000 - 1400 MHz FM mode (TX & RX)

1. Remove power and antenna.
2. Remove screws and open the radio.
3. Locate logic board.
4. Locate and **remove Diode D21.** (RX mod)
5. Locate and **remove Diode D22.** (1200 TX mod)
6. Locate and **remove Diode D23.** (440 TX mod)
7. Locate and **remove Diode D24.** (144 TX mod) or jumper W17 may be removed.
8. Reassemble the radio.
9. You may be required to reset the microprocessor. (see owners manual)



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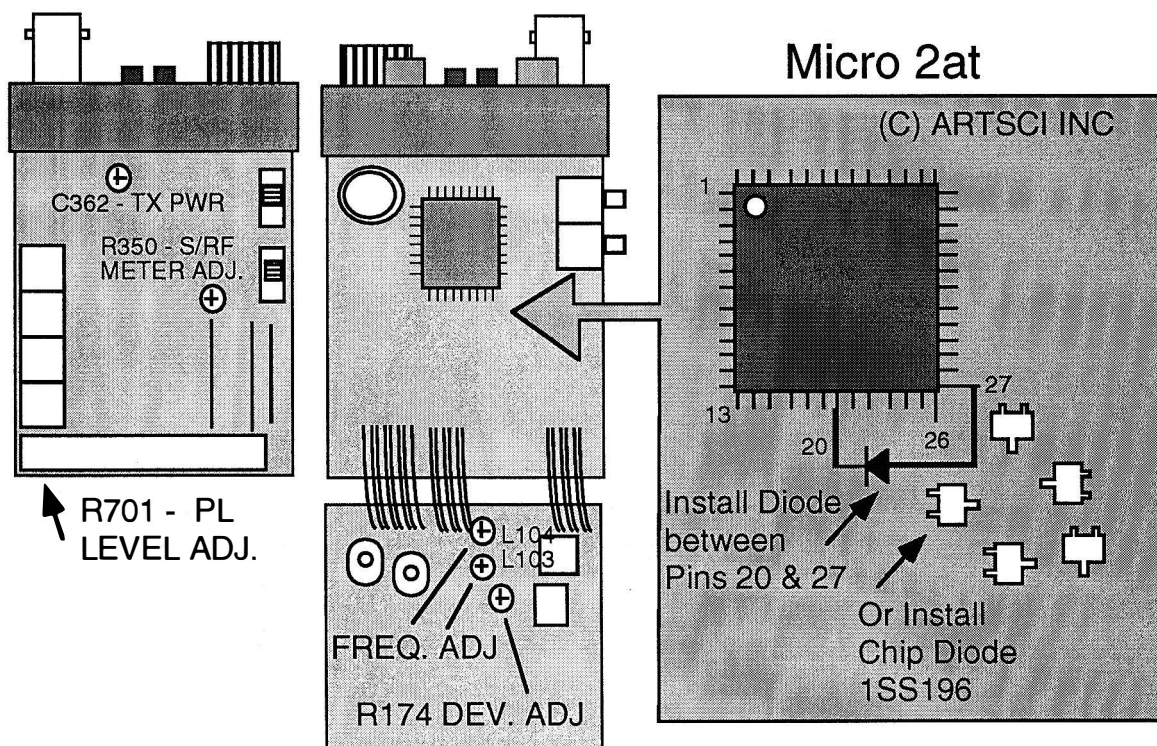
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ICOM μ 2AT

EXPANDED RF

1. Remove battery and antenna.
2. Remove 4 screws and open Radio.
3. Separate shield & top circuit board from bottom board.
4. Locate Microprocessor board.
5. **Tack solder a 1N914 Diode across Pin 20 & 27**
or attach a chip Diode 1SS196 as shown.
6. Reassemble the radio.
7. **Reset the microprocessor.** (Push and hold lamp and turn on power.)

Note: This diode is placed across pin 20 & 27 of CPU. Drawing is not to Scale.
MICROPROCESSOR is under the Tone Pad (under shield)



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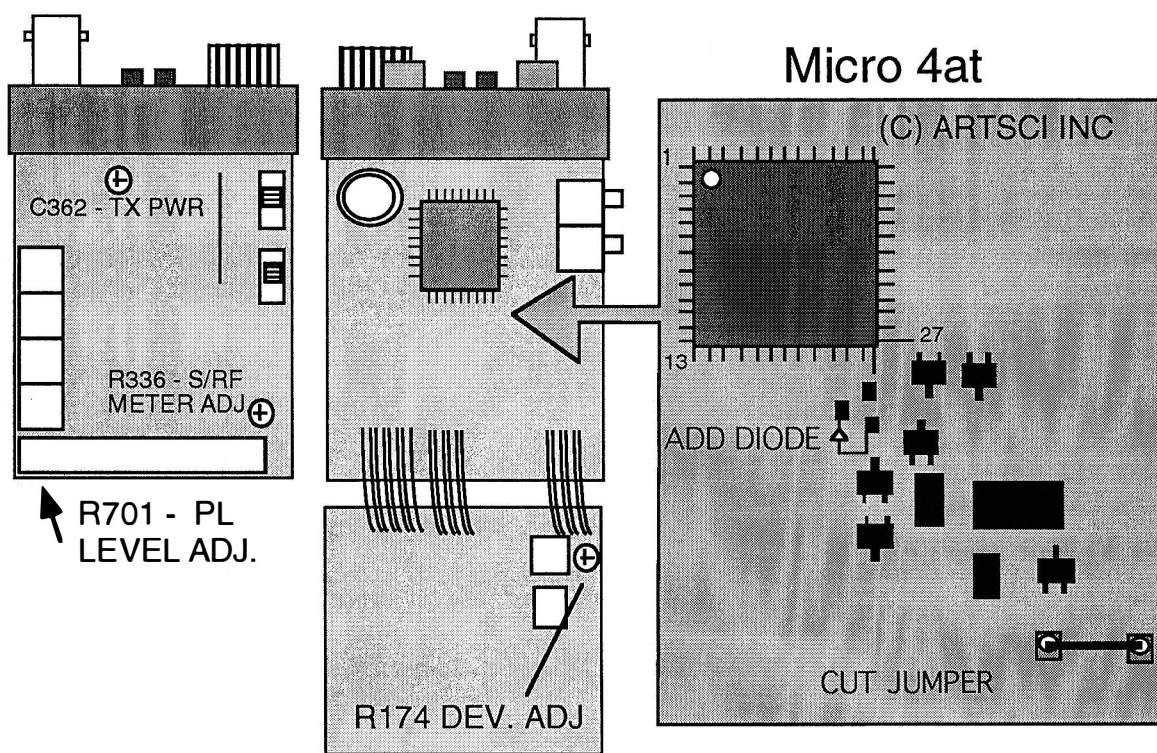
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ICOM μ 4AT

EXPANDED RF

1. Remove battery and antenna.
2. Remove 4 screws and open Radio
4. **Tack solder a 1N914 Diode across chip diode position.**
or attach a chip Diode 1SS196.
5. Reassemble the radio.
6. **Reset the microprocessor.** (Push and hold lamp and turn on power.)



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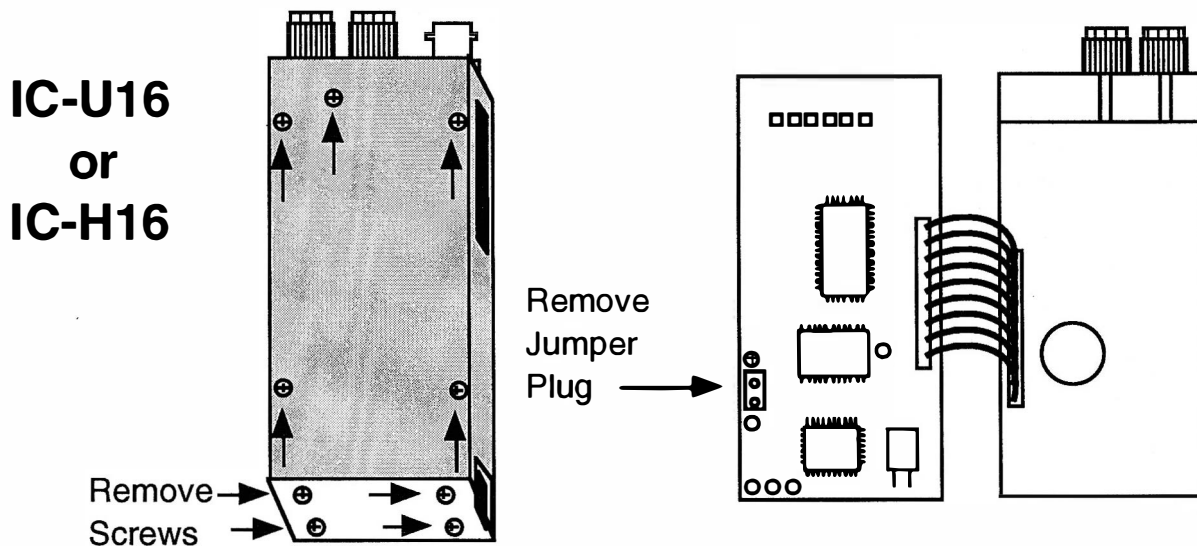
ICOM U16

USER PROGRAMMABLE MODIFICATION

1. Remove battery and antenna.
2. Remove 9 screws and open the radio.
3. Locate and remove Jumper plug.
4. Reassemble the radio.

Programming commands:

- 1) Hold down [FUNCTION] key and press [1] [5] [9] [3] [5] [7].
- 2) Hold down [FUNCTION] and press :
 - [1] - Transmit PL tone. (2 digits)
 - [2] - Receive PL Tone. (2 digits)
 - [4] - Offset in MHz. (i.e.. +05000 =+5 MHz)
 - [5] - Frequency.
 - [7] - Rename Ch#
 - [8] - Time out Timer
 - [9] - TX Inhibit
- 3) Enter #'s and press [ENT].
- 4) To Exit Programming mode Hold [FUNCTION] and press [CLR].



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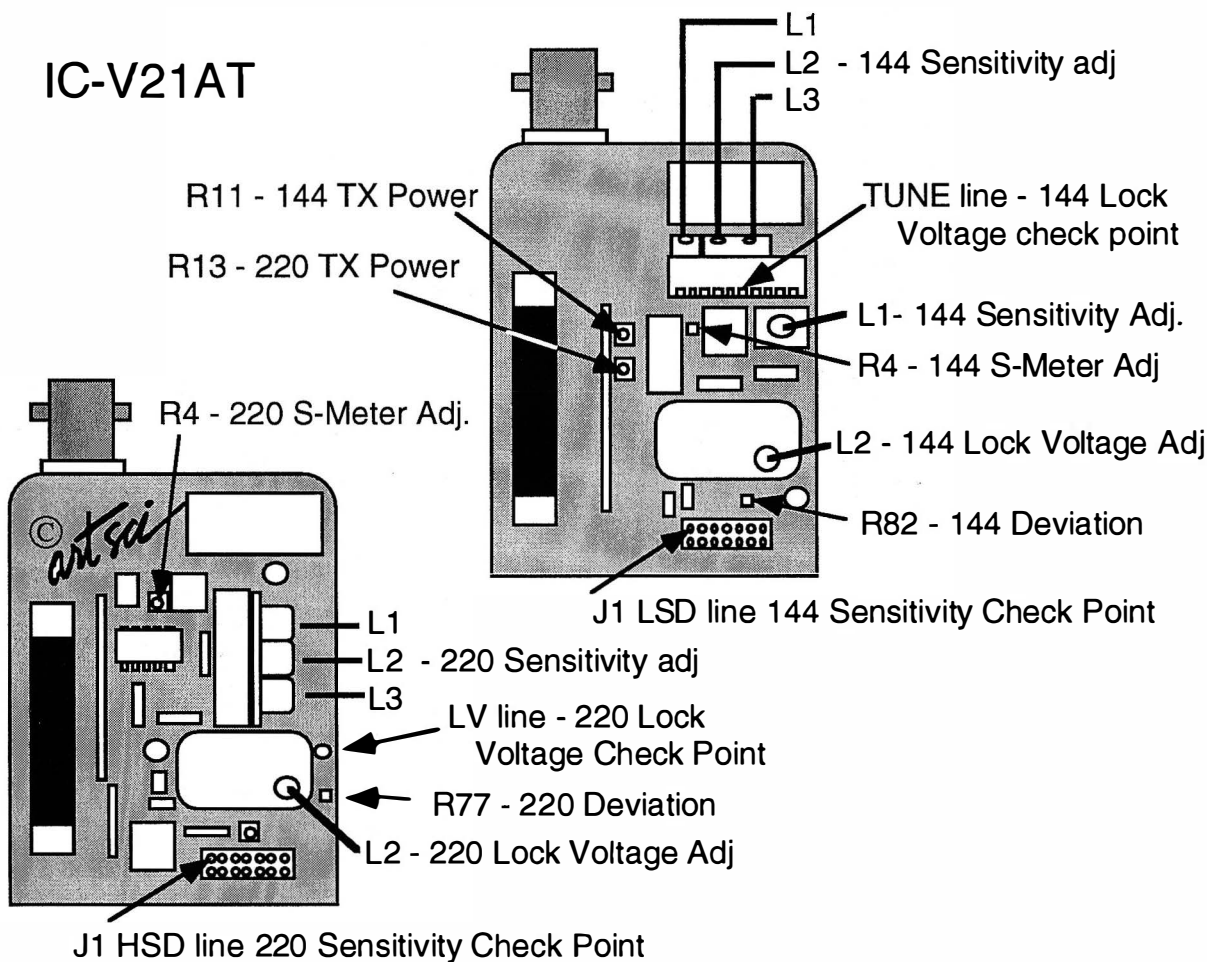
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ICOM IC-V21AT

EXPANDED RF / ALIGNMENT CONTROLS

1. Remove battery and antenna.
2. Remove screws from back panel and battery plate and open radio.
3. **Locate and cut Diode D23** on logic unit.
4. Reassemble the radio.
5. Reset the microprocessor. (Press and hold [FUNC] & [A] & [*] & turn power on)



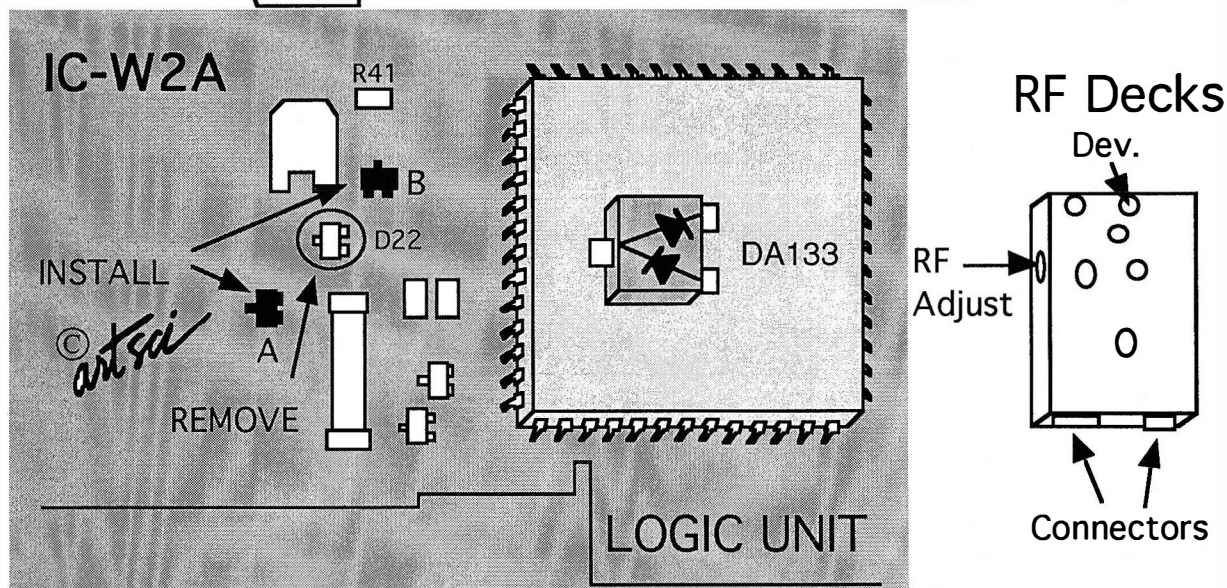
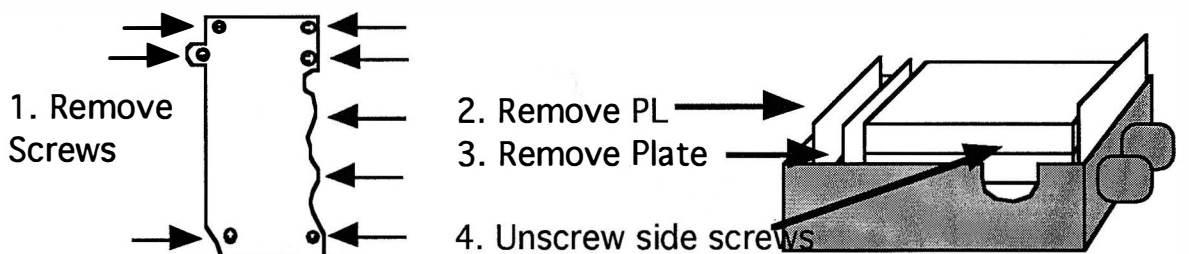
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ICOM IC-W2A

EXPANDED RF

1. Remove battery and antenna.
2. Remove screws from back panel and battery plate and open radio.
3. Remove PL deck and power plate.
4. Unplug VHF & UHF decks.
5. **Remove Chip diode D22.**
6. **Attach Chip diodes to location points A & B.**
(Diode MA133 - ICOM part # 1790000860)
7. Reassemble the radio.
8. **Reset the CPU** (Push and hold [FUNCTION] & [A] & [CLR] and turn radio on)



IC-W2A KEYBOARD COMMANDS:

RX Expansion	Push and hold [#] & [B] & [3] and turn power on.
Direct Entry	Set VFO PL to 100 Hz on VHF and UHF!!!! [F] & [SET] to select 1, 10, or 100 MHz freq. entry.
XBand Repeat on	Hold [FUNCTION] press [2] and then [#].
XBand Repeat off	Push and hold [FUNCTION] & [#].
Display Test	Push and hold [#] & [LIGHT] & [B]

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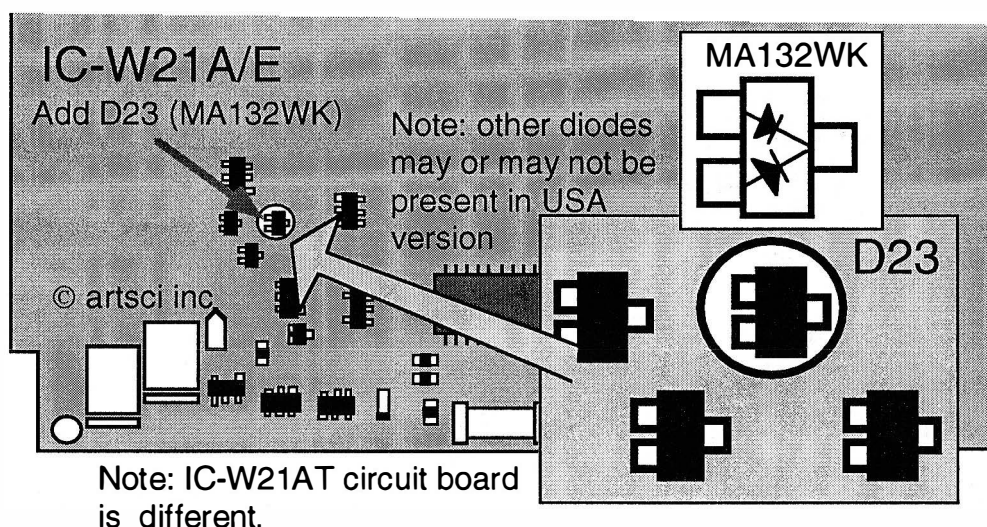


ICOM IC-W21A/E

EXPANDED RF/Cross Band repeater

1. Remove battery and antenna.
2. Remove screws and open radio.
3. Locate LOGIC board.
4. Locate position D23 and **add Diode D23** (MA132WK)
5. Reassemble the radio.
6. **Reset the Microprocessor** (Press [LIGHT] +[MONI] & turn power on)
7. Enter Expand function (Press [LIGHT] +[MONI] + [V/M] & turn power on)

Range: 108 - 136 MHz AM RX, 136 - 179 MHz FM RX,
311 - 460 MHz FM, 800 - 945 MHz



IC-21A CROSSBAND REPEATER COMMAND-

1. Press [LIGHT] & [V/M] & turn power on
 2. Set frequencies.
 3. Press [FUNC] & [LIGHT] - Lock Frequencies
 4. Turn radio off
 5. Press [FUNC] & [MONI] & [RPT] & turn power on. (Press [MONI] to stop TX.)
- CLEAR: Press [FUNC] & [LIGHT]



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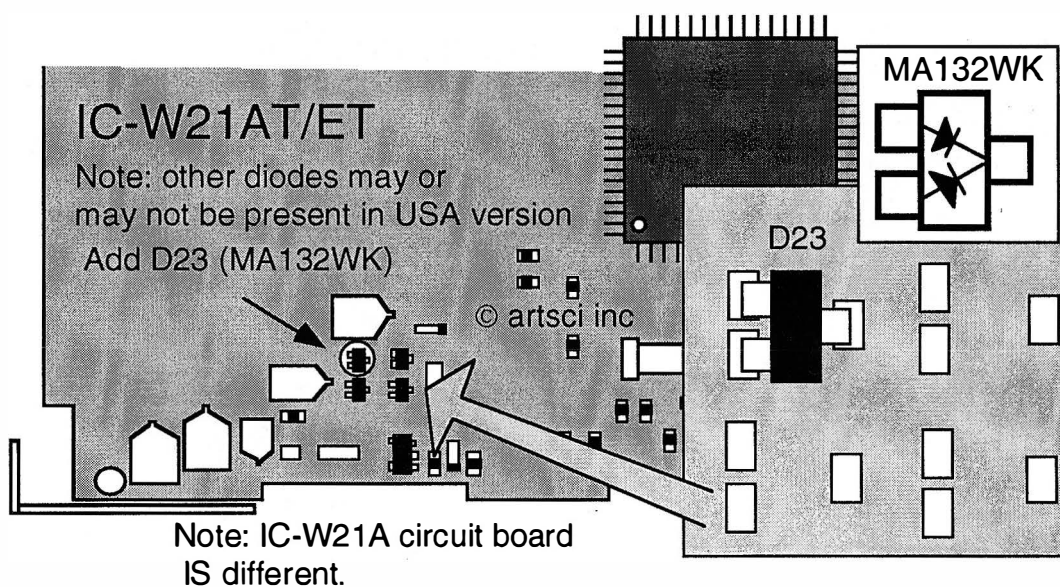
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ICOM IC-W21AT/ET

EXPANDED RF/Cross Band repeater

1. Remove battery and antenna.
2. Remove screws and open radio.
3. Locate LOGIC board.
4. Locate position D23 and **add Diode D23** (MA132WK)
5. Reassemble the radio.
6. **Reset the Microprocessor** (Press [FUNC] +[A] + [V/SCAN] & turn power on)
7. Enter Expand function (Press [B] & [#] & turn power on)

Range: 108 - 138 MHz AM RX, 136 - 179 MHz FM RX,
311 - 460 MHz FM, 800 - 945 MHz



IC-21AT/ET CROSSBAND REPEATER COMMAND-

1. Set Both VHF & UHF frequencies
 2. Set [KEY LOCK] and press [F] & [C] and turn power off
 3. Press [F] & [MONI] & [PRT-M] and turn power on.
- CLEAR: Press [F] & [C]

MORE ---

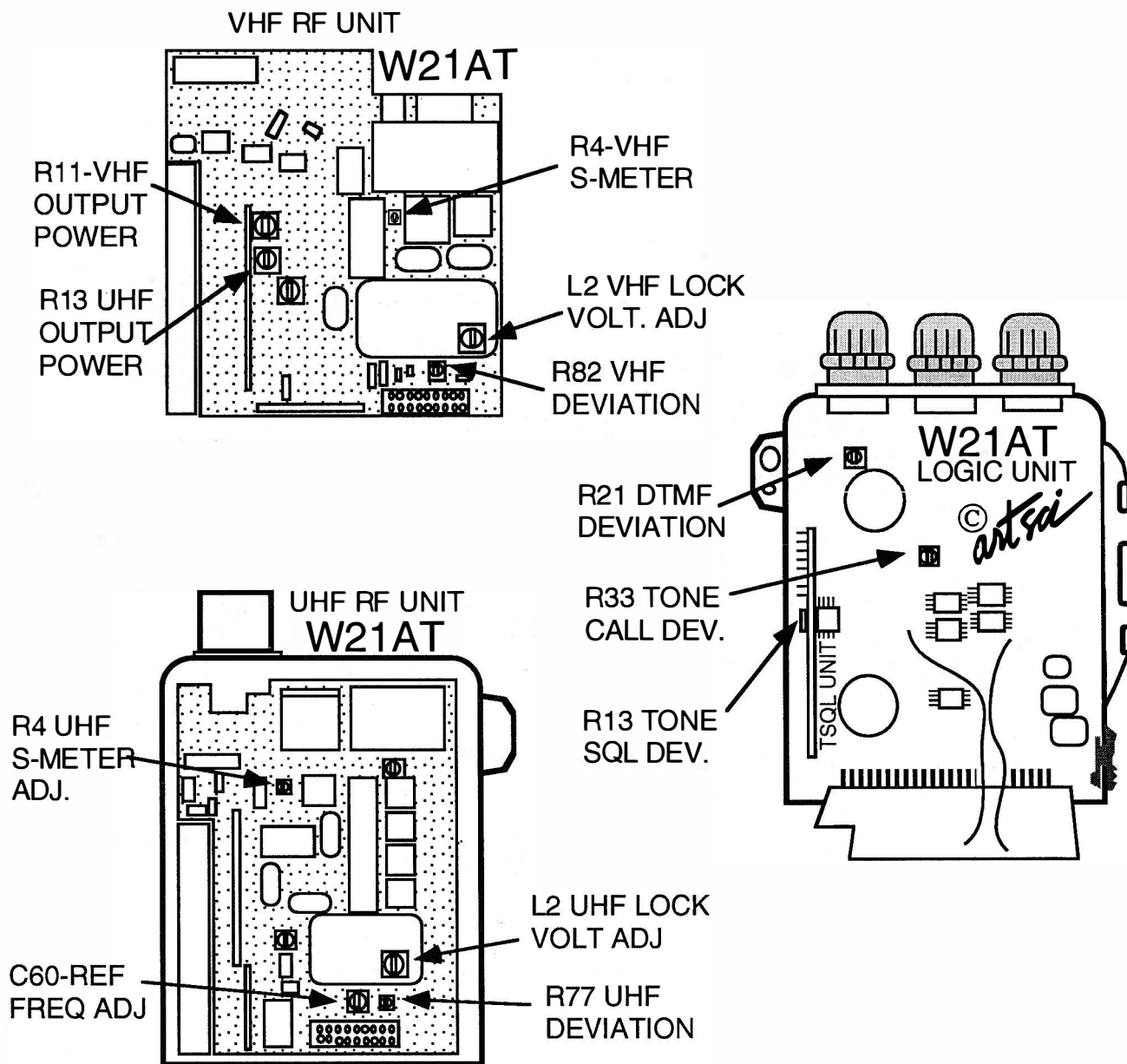
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ICOM IC-W21AT/ET

ALIGNMENT CONTROLS



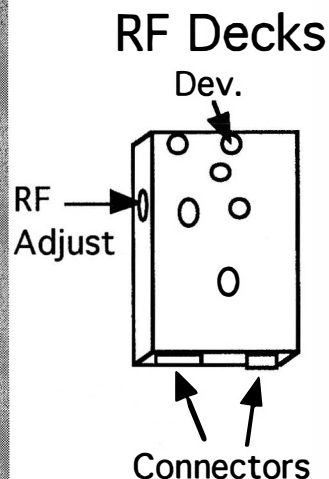
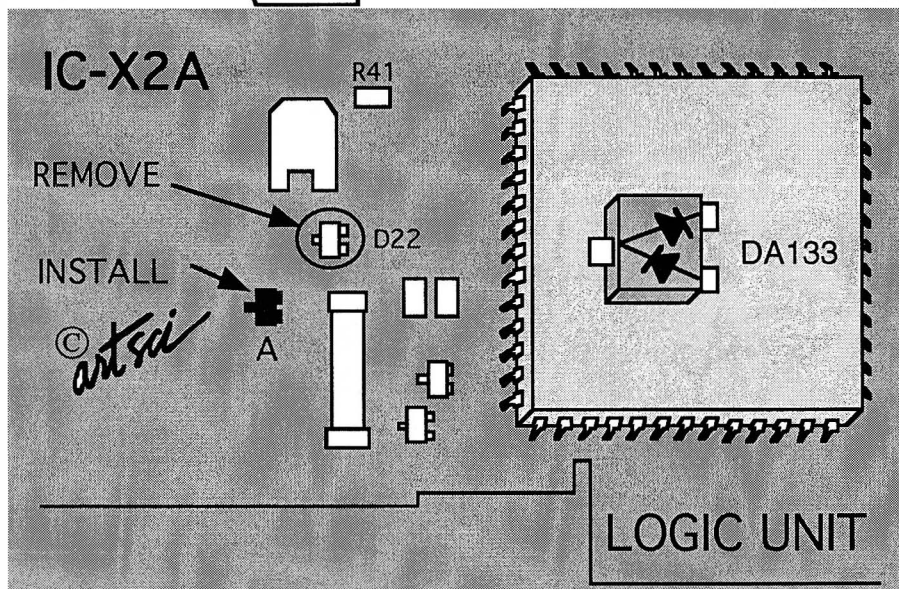
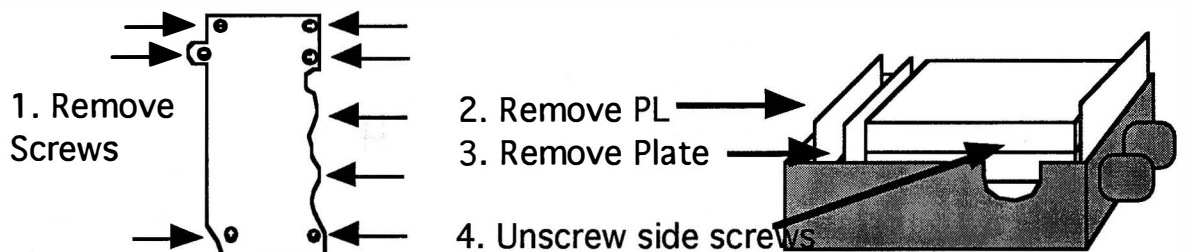
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ICOM IC-X2A

EXPANDED RF

1. Remove battery and antenna.
2. Remove screws from back panel and battery plate and open radio.
3. Remove PL deck and power plate.
4. Unplug UHF & 1.2 GHz decks.
5. **Remove Chip diode D22.**
6. **Attach Chip diodes to location point A.**
(Diode MA133 - ICOM part # 1790000860)
7. Reassemble the radio.
8. **Reset the CPU** (Push and hold [FUNCTION] & [A] & [CLR] and turn radio on)



IC-W2A KEYBOARD COMMANDS:

RX Expansion	Push and hold [#] & [B] & [3] and turn power on.
Direct Entry	Set VFO PL to 100 Hz on VHF and UHF!!!!
	[F] & [SET] to select 1, 10, or 100 MHz freq. entry.
XBand Repeat on	Hold [FUNCTION] press [2] and then [#].
XBand Repeat off	Push and hold [FUNCTION] & [#].
Display Test	Push and hold [#] & [LIGHT] & [B]

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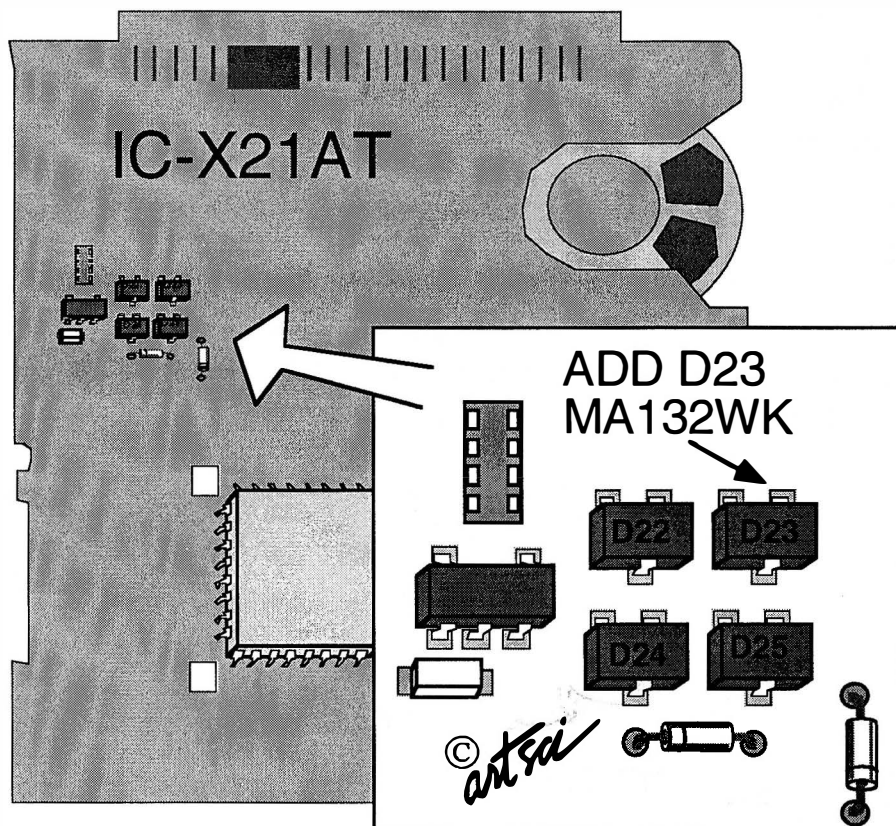
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ICOM IC-X21AT

EXPANDED RF

1. Remove battery and antenna.
2. Remove screws from back panel and battery plate and open radio.
3. Locate main logic board.
4. **Install Diode D23** in position shown. (D23 is a MA132WK)
5. Reassemble the radio.
6. Reset the microprocessor, if required.

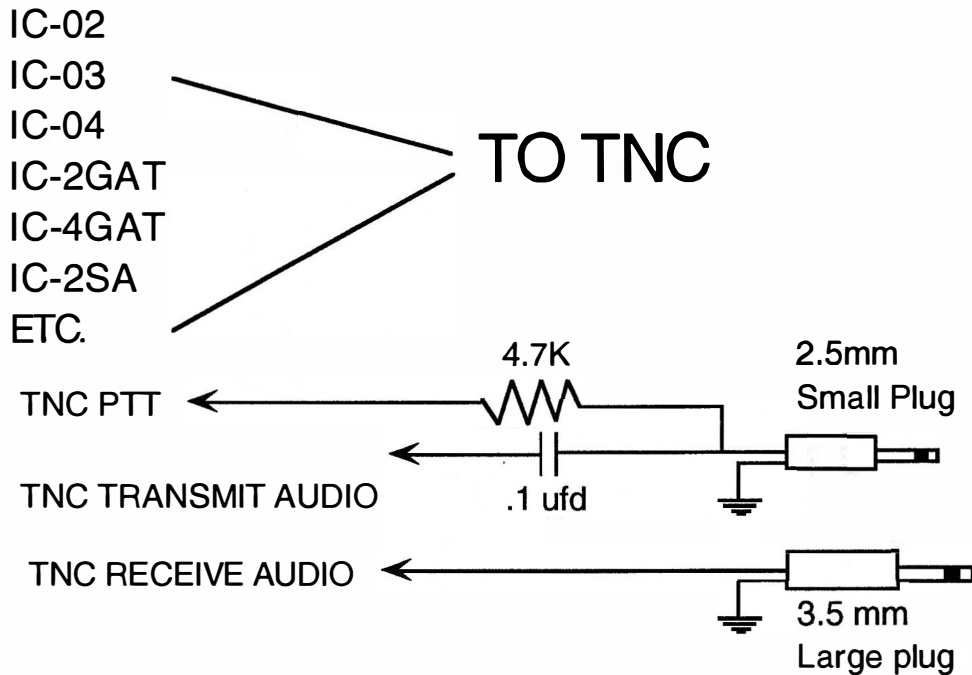


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ICOM HT's TO TNC'S

INTERFACE CABLES



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ICOM RADIOS

CPU RESET

- 2GAT TURN RADIO ON, HOLD [LIGHT] & [FUNCTION], TURN RADIO OFF, TURN ON AND RELEASE BUTTONS.
- 02AT BELOW SERIAL # 34,000 - PUSH BUTTON ON MAIN BOARD NEXT TO LITHIUM BATTERY.
ABOVE SERIAL # 34,000 - HOLD [FUNCTION] AND TURN RADIO ON.
- 2SA HOLD [LIGHT] & [MONITOR] AND TURN RADIO ON.
- 2SAT HOLD [FUNCTION] & [A] AND TURN RADIO ON.
- 2SRA HOLD [FUNCTION] & [A] & CLR] & TURN RADIO ON.
- u2AT HOLD [LIGHT] AND TURN RADIO ON.
- 03AT BELOW SERIAL # 34,000- PUSH BUTTON ON MAIN BOARD NEXT TO LITHIUM BATTERY.
ABOVE SERIAL # 34,000 - HOLD [FUNCTION] AND TURN RADIO ON.
- 3SA HOLD [LIGHT] & [MONITOR] AND TURN RADIO ON.
- 3SAT HOLD [FUNCTION] & [A] AND TURN RADIO ON.
- 4GAT TURN RADIO ON, HOLD [LIGHT] & [FUNCTION], TURN RADIO OFF, TURN ON AND RELEASE BUTTONS.
- 04AT BELOW SERIAL # 34,000 - PUSH BUTTON ON MAIN BOARD NEXT TO LITHIUM BATTERY.
ABOVE SERIAL # 34,000 - HOLD [FUNCTION] AND TURN RADIO ON.
- 4SA HOLD [LIGHT] & [MONITOR] AND TURN RADIO ON.
- 4SAT HOLD [FUNCTION] & [A] AND TURN RADIO ON.
- 4SRA HOLD [FUNCTION] & [A] & CLR] & TURN RADIO ON.
- u4AT HOLD [LIGHT] AND TURN RADIO ON.
- 12AT HOLD [FUNCTION] AND TURN RADIO ON.
- 12GAT TURN RADIO ON, HOLD [LIGHT] & [FUNCTION], TURN RADIO OFF, TURN ON AND RELEASE BUTTONS.



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ICOM RADIOS

CPU RESET (PART 2)

- 24AT HOLD [FUNCTION] & [A] AND TURN RADIO ON.
- 27 PUSH RESET BUTTON UNDER TOP COVER
- 28 INSERT A TOOTHPICK INTO HOLE IN THE CORNER OF THE BOTTOM COVER
PRESSING THE RESET BUTTON.
- 32AT HOLD [FUNCTION] & [A] & [LIGHT] AND TURN POWER ON.
- 37 PUSH RESET BUTTON UNDER TOP COVER.
- 38 INSERT TOOTHPICK INTO HOLE IN THE CORNER OF THE BOTTOM COVER PRESSING THE
RESET BUTTON.
- 47 PUSH RESET BUTTON UNDER TOP COVER
- 48 INSERT TOOTHPICK INTO HOLE IN THE CORNER OF THE BOTTOM COVER PRESSING THE
RESET BUTTON.
- 228 HOLD [SQUELCH/MONITOR] & [LOCK] AND TURN RADIO ON.
- 229A HOLD [SET] & [MW] AND TURN RADIO ON.
- 271 REPROGRAM RAM CARD.
- 275 HOLD [M-CL] AND TURN RADIO ON.
- 375 HOLD [M-CL] AND TURN RADIO ON.
- 448 HOLD [SQUELCH/MONITOR] & [CLOCK] AND TURN RADIO ON.
- 471 REPROGRAM RAM CARD.
- 475 HOLD [M-CL] AND TURN RADIO ON.
- 575 HOLD [M-CL] AND TURN RADIO ON.
- 725 HOLD [FUNCTION] & [MW] AND TURN RADIO ON.
- 726 HOLD [FUNCTION] & [MW] AND TURN RADIO ON.

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ICOM RADIOS

CPU RESET (PART 3)

- 761 HOLD [M-CLEAR] AND TURN RADIO ON.
- 765 HOLD [M-CLEAR] AND TURN RADIO ON.
- 781 HOLD [M-CLEAR] AND TURN RADIO ON.
- 900 HOLD [MR] AND TURN POWER OFF AND THEN ON AGAIN.
- 901A TURN RADIO ON, PUCH [CHECK] & [MW]
- 970 HOLD [MW] AND TURN RADIO ON.
- 1200 INSERT TOOTHPICK INTO HOLE IN THE CORNER OF THE BOTTOM COVER PRESSING THE RESET BUTTON.
- 1201 HOLD [SQUELCH/MONITOR] & [LOCK] AND TURN RADIO ON.
- 1220 TURN RADIO OFF FOR A FEW MINUTES AND THEN PRESS SWITCH S1 ON LOGIC BOARD.
- 1271 REPROGRAM RAM CARD.
- 1275 HOLD [M-CL] AND TURN RADIO ON.
- 1520 TURN RADIO OFF FOR A FEW MINUTES AND THEN PRESS SWITCH S1 ON LOGIC BOARD.
- 1600 TURN POWER OFF, WAIT A FEW MINUTES AND TURN POWER ON.
- 3200 HOLD [F] BUTTON AND TURN POWER ON.
- 3210 HOLD [SQUELCH/MONITOR] & [LOCK] AND TURN RADIO ON.
- 3220 HOLD [SET] & [MW] AND TURN RADIO ON
- 2400 HOLD [SUB VOL] AND [MW] AND TURN RADIO ON.
- 2500 HOLD [SUB VOL] AND [MW] AND TURN RADIO ON.



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ICOM RADIOS

CPU RESET (PART 4)

- 4020 TURN RADIO OFF FOR A FEW MINUTES AND THEN PRESS SWITCH S1 ON LOGIC BOARD.
- 4520 TURN POWER OFF, WAIT A FEW MINUTES AND TURN POWER ON.
- A2 HOLD [FUNCTION] & [PTT] & TURN POWER ON.
- A20 HOLD [FUNCTION] & CLEAR] & TURN POWER ON.
- A21 HOLD [FUNCTION] & CLEAR] & TURN POWER ON.
- H8 RECLONE OR HOLD [PTT] & [CLONE] & TURN POWER ON.
- H10 RECLONE OR HOLD [PTT] & [CLONE] & TURN POWER ON.
- H16 RECLONE
- H18 RECLONE
- H19 RECLONE
- M5 PUSH BUTTON ON MAIN BOARD NEXT TO LITHIUM BATTERY.
- M7 TURN RADIO ON & HOLD [HI/LOW] & [LOCK] & TURN OFF POWER.
 PUSH [CH16D] TO SELECT DIAL MODE.
- M11 TURN ON & HOLD [LIGHT] & [FUNCTION] & TURN OFF POWER & ON AGAIN.
 PUSH [CH16D] TO SELECT DIAL MODE.
- M55 REMOVE CLEAR PLASTIC SCREW FROM BOTTOM COVER,
 INSERT A TOOTHPICK TO PUSH RESET BUTTON.
- M56 TURN RADIO ON & HOLD [CH16] & [MR] & TURN OFF & TURN ON.
- M80 DISCONNECT LITHIUM BATTERY.
- M100 TURN RADIO ON & HOLD [SQUELCH] KNOB & PRESS RESET.

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ICOM RADIOS

CPU RESET (PART 5)

- M120 TURN RADIO ON & HOLD [CH16] & [USA], TURN RADIO OFF AND BACK ON.
- M500 HOLD [DIMMER] & 13/67] & TURN POWER ON.
- R 1 HOLD [FUNCTION] & [CL] & TURN POWER ON.
- R72 HOLD [MW] & TURN POWER ON.
- R100 HOLD [FUNCTION] & [ENT] & TURN POWER ON.
- R9000 HOLD [M-WRITE] AND TURN RADIO ON.
- U8 RECLONE OR HOLD [PTT] & [CLONE] & TURN POWER ON.
- U10 RECLONE OR HOLD [PTT] & [CLONE] & TURN POWER ON.
- U16 RECLONE.
- U18 RECLONE
- U19 RECLONE.
- U200 RECLONE
- U400 RECLONE
- V100 RECLONE
- V200 RECLONE
- W2A HOLD [FUNCTION] & [A] & [CLR] AND TURN RADIO ON.



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Performance Report

Radio _____

Date _____

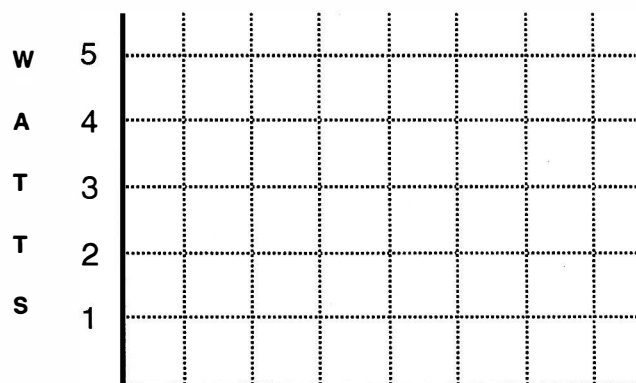
Owner : Name _____

Address _____

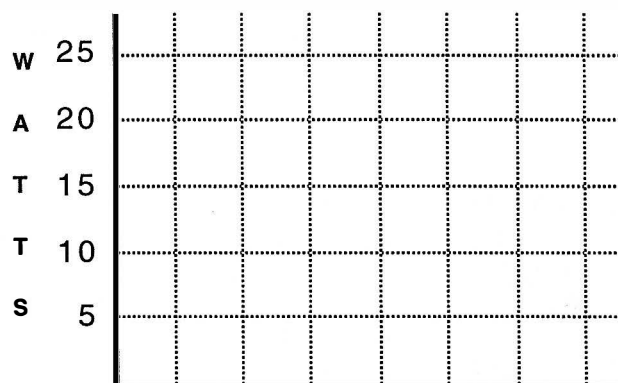
City _____ St. _____ Zip _____

Phone () _____ - _____

Description	Before	After
Power out (Low)	_____ Watts	_____ Watts
Power out (High)	_____ Watts	_____ Watts
Frequency Error (Simplex)	_____ Hz	_____ Hz
Frequency Error (Offset)	_____ Hz	_____ Hz
Receive Sensitivity (Mid-band)	_____ uv	_____ uv
Receive Sensitivity (____MHz)	_____ uv	_____ uv
Receive Sensitivity (____MHz)	_____ uv	_____ uv
PL Deviation	_____ Hz	_____ Hz
DTMF Deviation	_____ KHz	_____ KHz
Audio Deviation	_____ KHz	_____ KHz
Lowest usable Freq @ .5 Pwr	_____ MHz	_____ MHz
Highest usable Freq @ .5 Pwr	_____ MHz	_____ MHz



Frequency

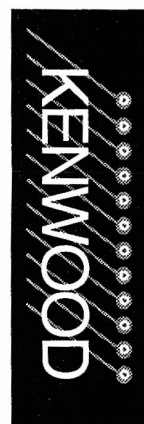


Frequency

Radio / Tech Modifications

Kenwood Radio Modifications

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Performance Report

Radio _____

Date _____

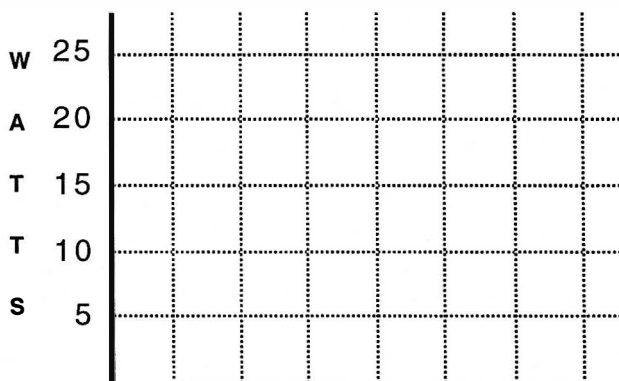
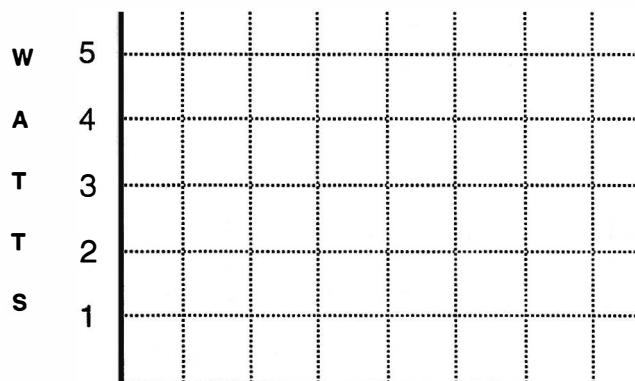
Owner : Name _____

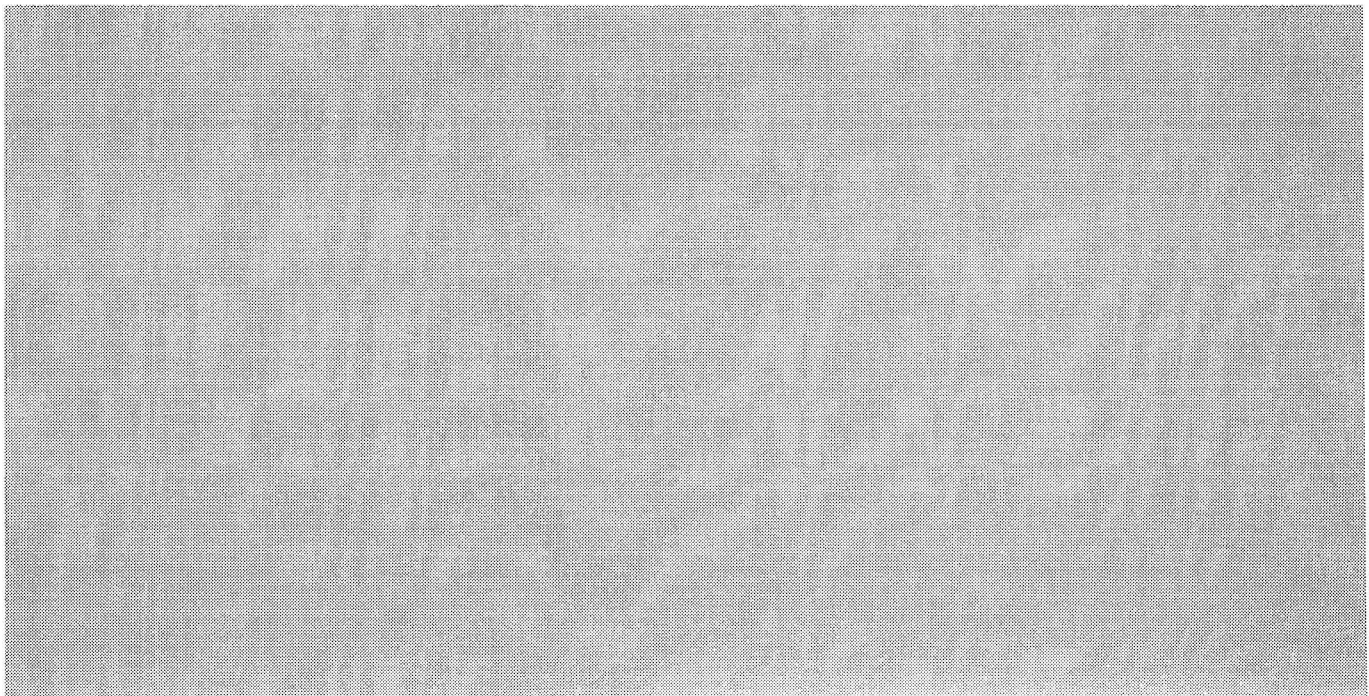
Address _____

City _____ St. _____ Zip _____

Phone () - _____

Description	Before	After
Power out (Low)	_____ Watts	_____ Watts
Power out (High)	_____ Watts	_____ Watts
Frequency Error (Simplex)	_____ Hz	_____ Hz
Frequency Error (Offset)	_____ Hz	_____ Hz
Receive Sensitivity (Mid-band)	_____ uv	_____ uv
Receive Sensitivity (____MHz)	_____ uv	_____ uv
Receive Sensitivity (____MHz)	_____ uv	_____ uv
PL Deviation	_____ Hz	_____ Hz
DTMF Deviation	_____ KHz	_____ KHz
Audio Deviation	_____ KHz	_____ KHz
Lowest usable Freq @ .5 Pwr	_____ MHz	_____ MHz
Highest usable Freq @ .5 Pwr	_____ MHz	_____ MHz



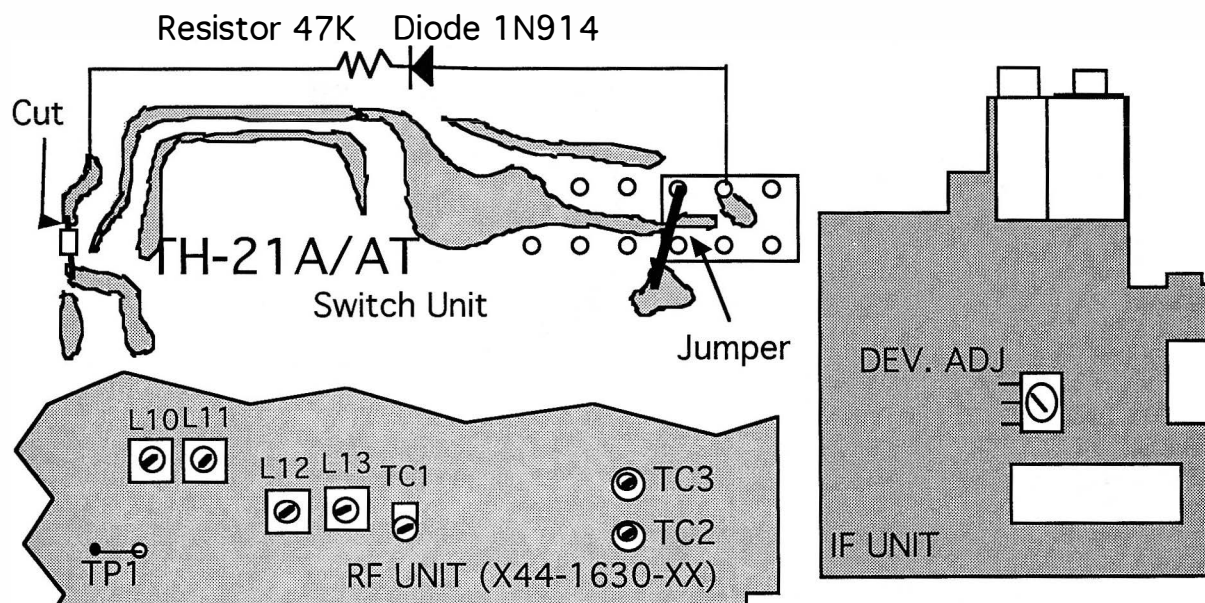
This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

KENWOOD TH-21A/AT

EXPANDED RF
140-159 MHz

1. Disconnect the battery and antenna.
2. Remove knobs, antenna nut ring and plastic top
3. Remove front panel.
4. Locate switch unit. (PCB X41-1590-00) This unit has the Vol., SQL etc.
5. **Cut trace between R1 and D4, D5**
6. **Install a jumper** from the common point of R11, R5 & 5C to the corner of the tone switch.
7. **Install a 1N914 diode and 48K resistor** from the center top pin of the tone switch to the end of resistor R1. (R1 was cut in step 5).
Note: Cathode end of the diode goes to the tone switch top center pin.
Cathode end of a diode has the line.
8. Adjust L10,L11,L12,L13,TC1,TC2 & TC3 for maximum upper frequency range.
9. Reassemble the radio.

Depress the tone switch to receive from 140 to 149 MHz
Tone switch off for 150 -159 MHz.



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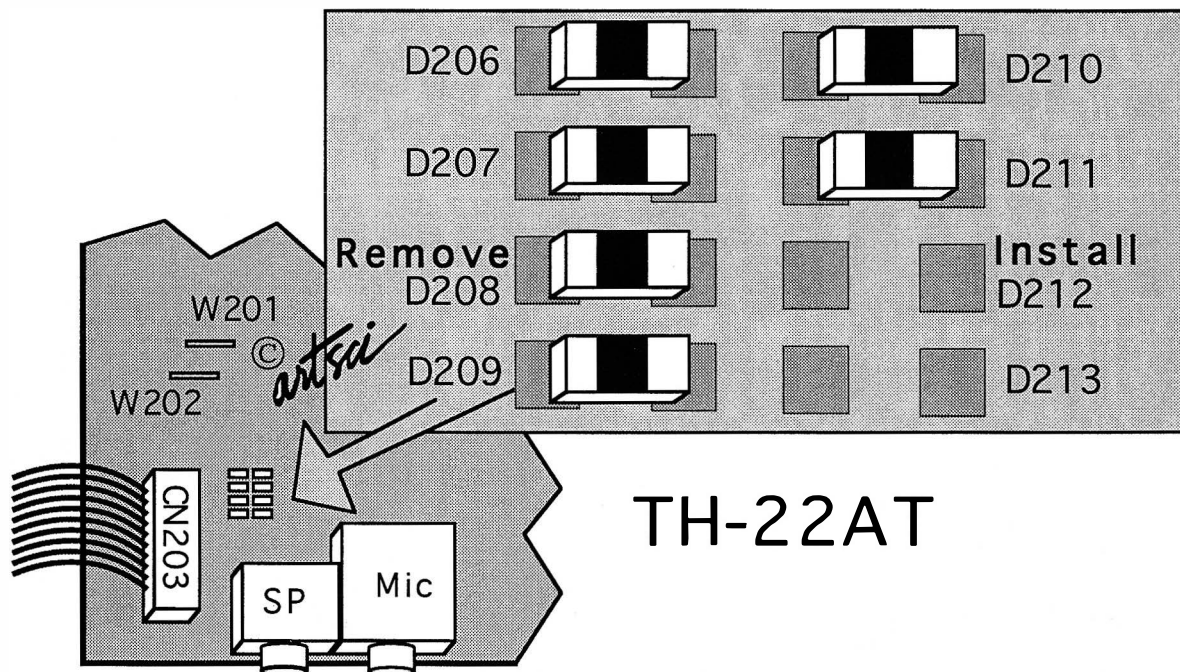
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KENWOOD TH-22AT

EXPANDED RF
136.000 MHz - 173.995 MHz

1. Disconnect the battery and antenna.
2. Remove 2 long screws for the rear case.
3. Remove the control knobs from the top of the radio.
4. Remove the rubber top panel.
5. Separate the front and back halves. (Squeeze the bottom front panel)
6. Locate and **remove Diode D-208**. (Located on the front panel circuit board)
7. **Install the diode into location D-212.**
(Diodes D-210, D-211 & D-212 face the same direction)
8. Reassemble the radio
9. Reset the microprocessor (see owners manual)



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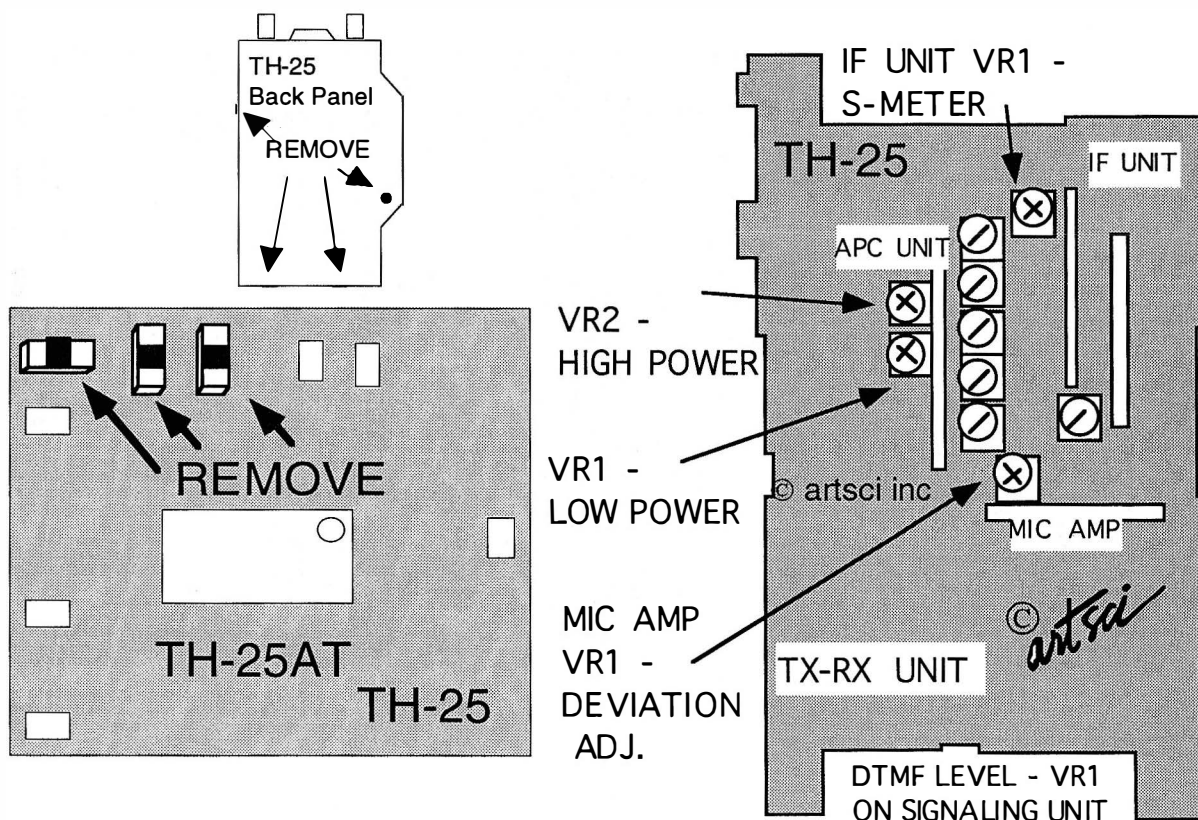
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KENWOOD TH-25AT

EXPANDED RF / ALIGNMENT CONTROLS

1. Disconnect the power and antenna.
2. Remove the volume, squelch and tuning control knobs
3. Remove the nuts from the volume control and tuning controls.
4. Remove screw located by the PTT switch.
5. Remove screw by the speaker jack
6. Remove two screws from the battery plate.
7. Carefully pull the front panel from the radio. Do not break any wires.
8. Gently lift the top panel from the radio by pulling it forward and then upwards.
The O ring on the BNC connector will cause some tension.
9. Rotate the top panel towards the front of the radio to expose the .75" X .75" board.
10. **Remove chip resistors R19, R20 & R21.**
11. Reassemble the radio.
12. **RESET the CPU.** Hold down [M] and turn power on.



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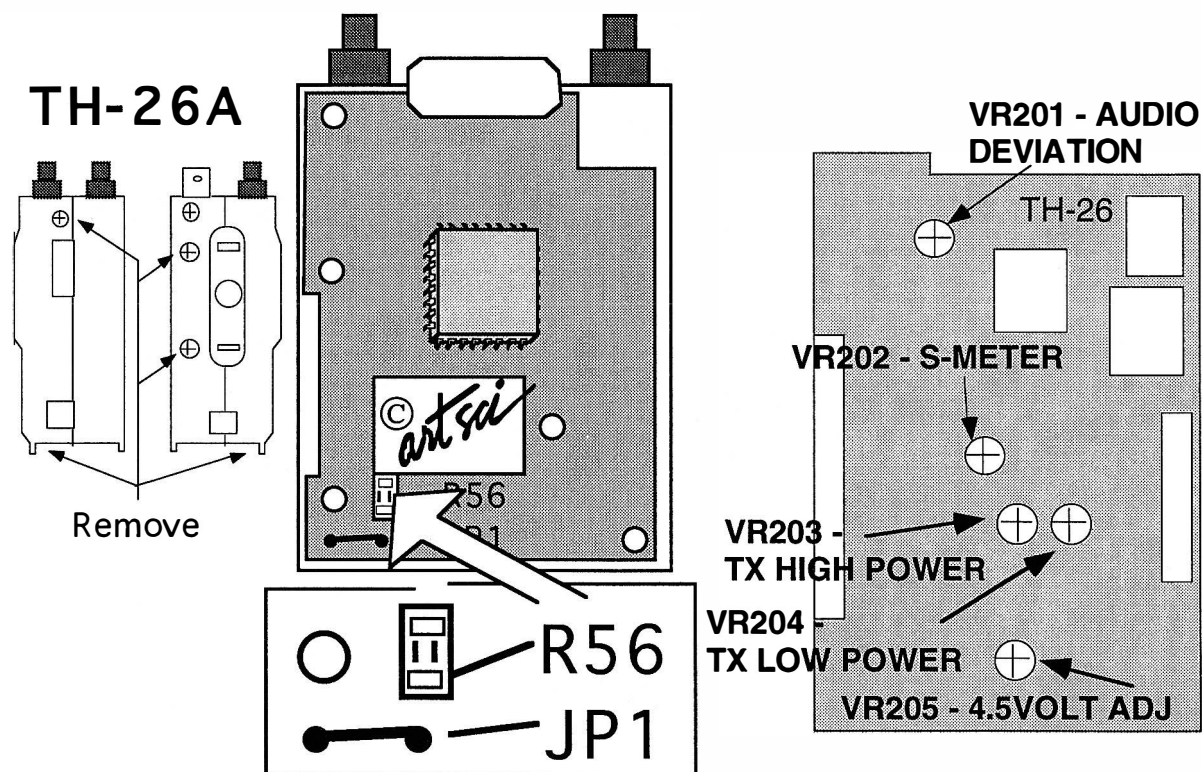
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KENWOOD TH-26A

EXPANDED RF / ALIGNMENT CONTROLS

- 1 Disconnect the power and antenna.
- 2 Remove 3 screws from the case and 2 from the battery plate.
- 3 Open the radio.
- 4 **Remove jumper JP1.** Use a soldering iron to remove the jumper. Do not pull the jumper or overheat the board.
- 5 Unsolder and **remove chip resistor R56.**
- 6 Reassemble the radio. Carefully re-seat the O-Ring on the BNC connector.
- 7 **Reset the microprocessor.** (Press and hold the [F] key and turn the power on.)

Note: Automatic offset selection will be disabled when this mod is performed.



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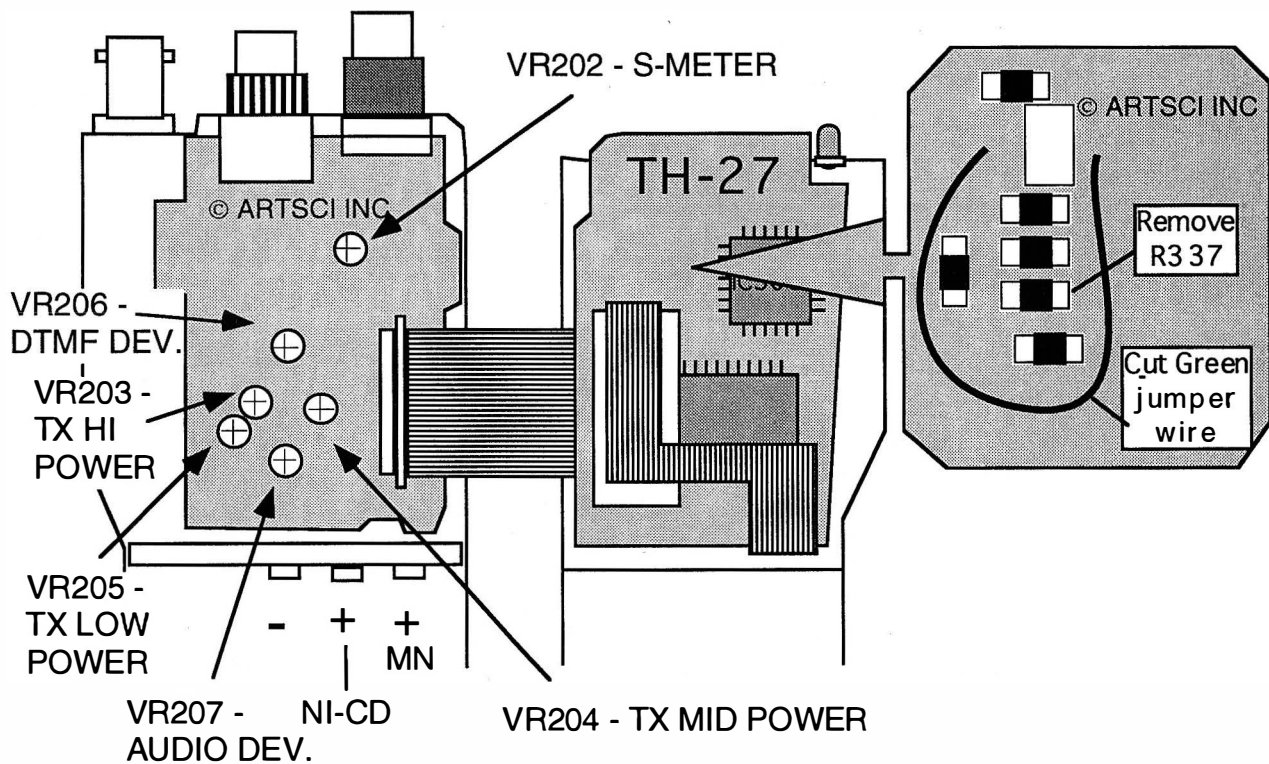
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KENWOOD TH-27A

EXPANDED RF / ALIGNMENT CONTROLS

1. Disconnect the Power and antenna.
2. Remove 4 screws from the back panel.
3. Open the bottom of the front panel first and slide the panel downward.
4. Open the radio being careful not to break the flex cable.
5. Move the tone board out of the way to expose the green jumper wire located inside the front panel assembly.
6. **Cut the GREEN Jumper wire.**
7. **Remove chip resistor R337.** (Disables AM receive & auto offset)
8. Reassemble the radio. Carefully re-seat the O-Ring on the BNC connector.
9. **Reset the Microprocessor.** (Press and hold the [M] key and turn the power on.)



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KENWOOD TH-28A

EXPANDED RF

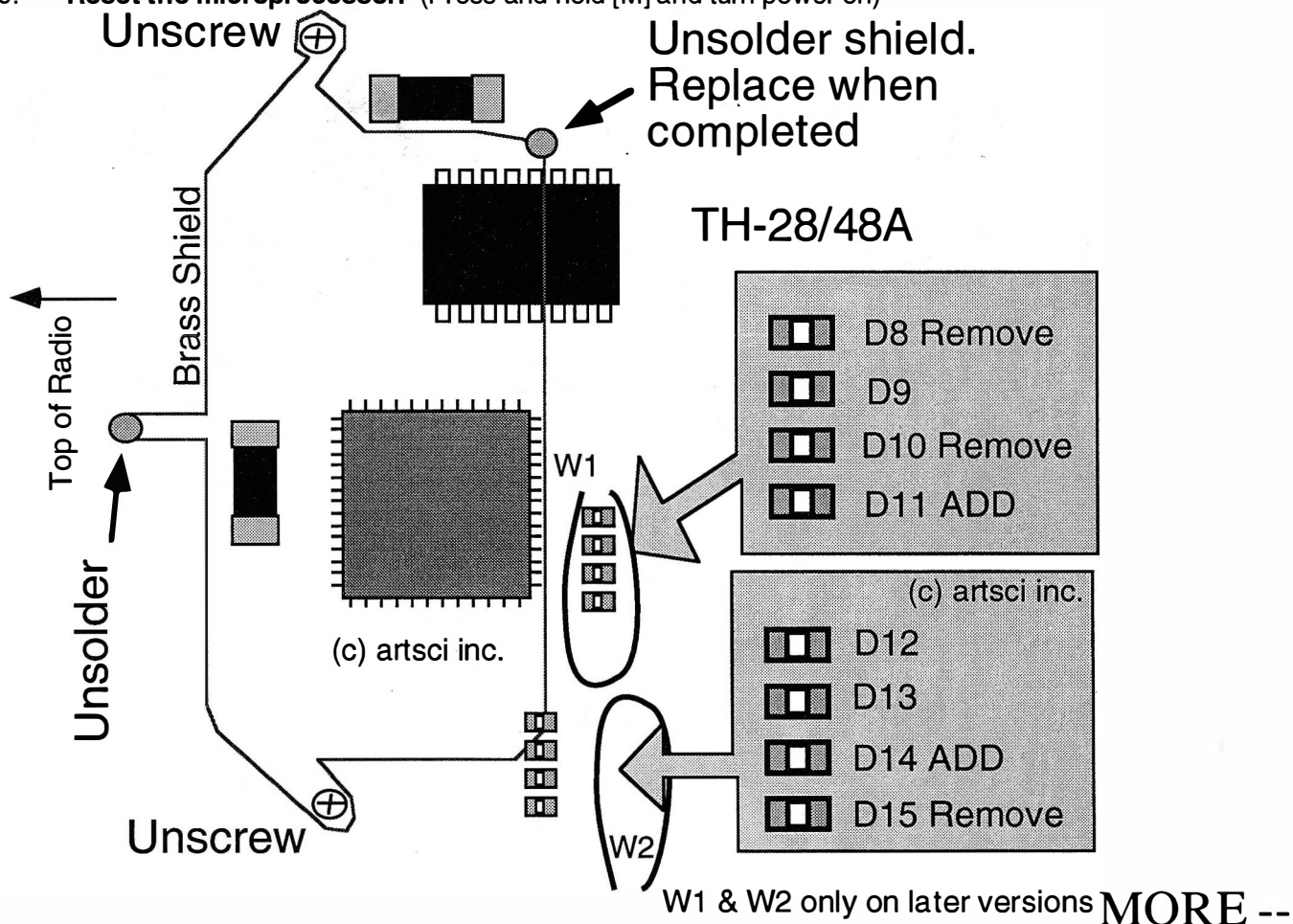
1. Disconnect the Battery and antenna.
2. Remove 4 back case screws and open the radio.

NOTE : THERE ARE 2 VERSIONS OF THIS RADIO.

The later versions have 2 green jumper wires.

Cut W2 jumper only and go to step 8 below

3. Locate & Unsolder the two solder tack point on the shield. (Not required in later version)
4. Remove the two screws holding the shield.
5. Locate chip diode positions D8.....D15. (part # MA110 or 1SS355)
6. **Remove Diode D8, D10 & D15.** (save the diodes)
7. **Install Diodes D11 & D14.** (used diodes removed in the previous step)
8. Reassemble the radio.
9. **Reset the microprocessor.** (Press and hold [M] and turn power on)



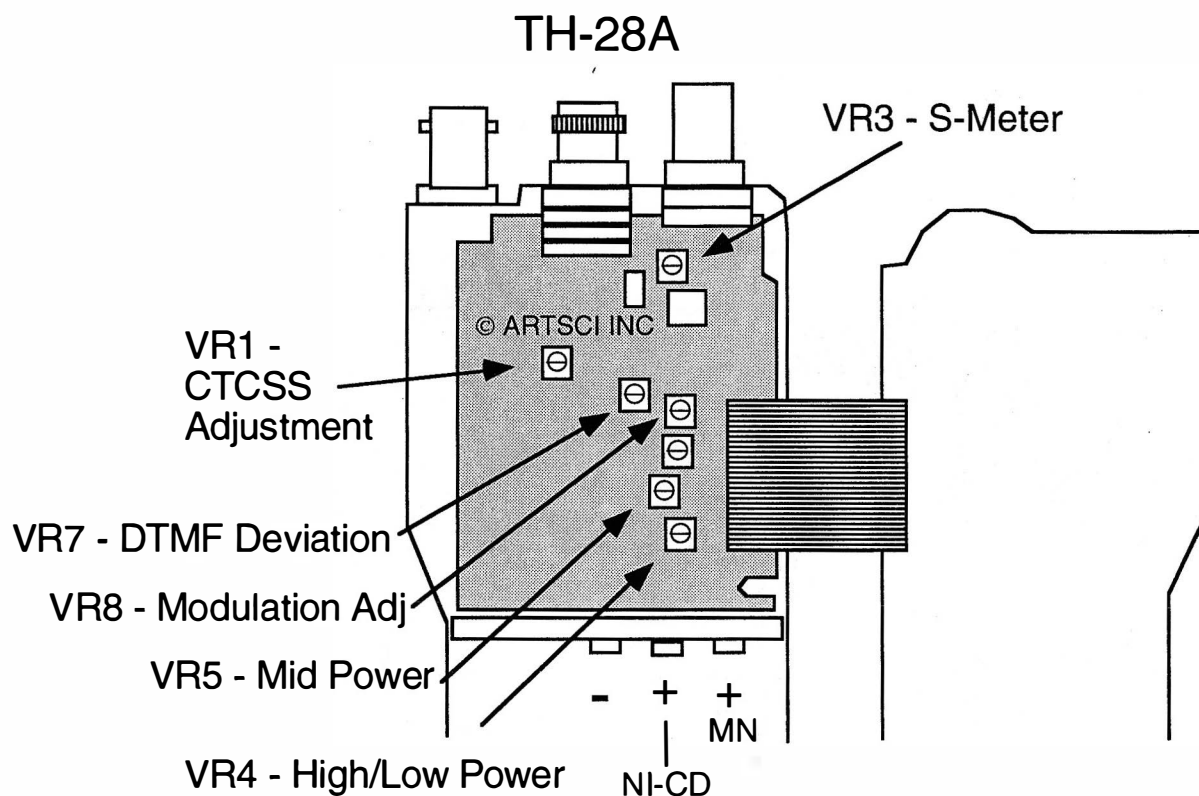
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KENWOOD TH-28A

ALIGNMENT POINTS

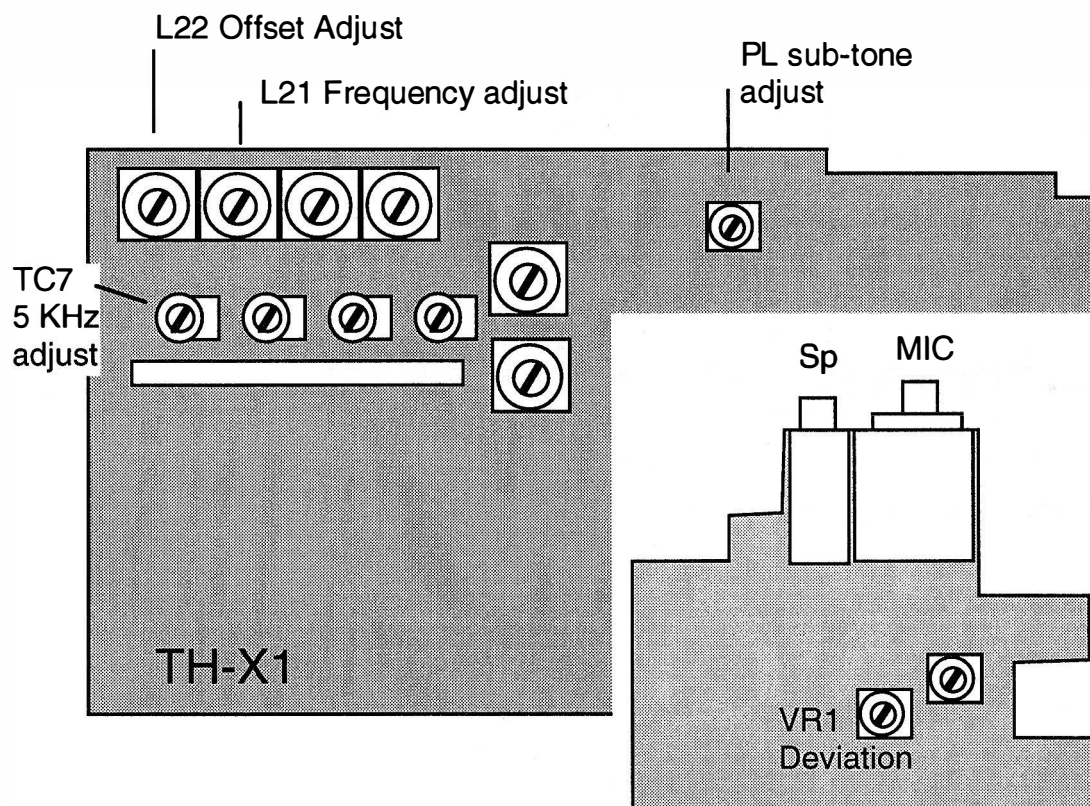


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KENWOOD TH-31 A/BT & TH-41 A/BT

ADJUSTMENT CONTROLS



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Performance Report

Radio _____

Date _____

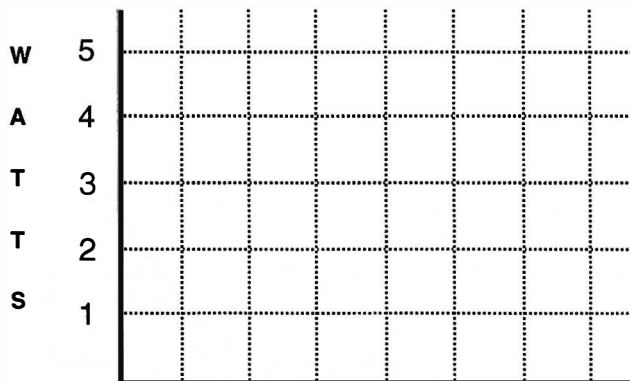
Owner : Name _____

Address _____

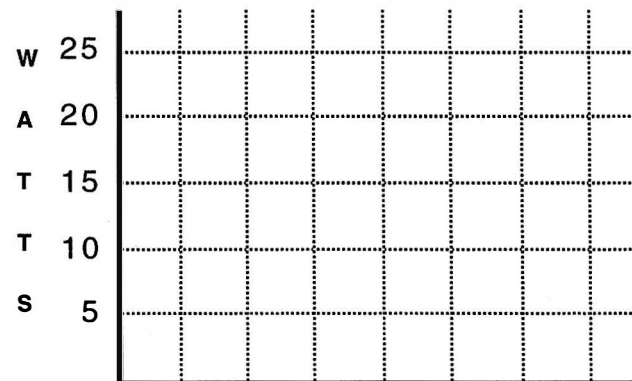
City _____ St. _____ Zip _____

Phone () - _____

Description	Before	After
Power out (Low)	_____ Watts	_____ Watts
Power out (High)	_____ Watts	_____ Watts
Frequency Error (Simplex)	_____ Hz	_____ Hz
Frequency Error (Offset)	_____ Hz	_____ Hz
Receive Sensitivity (Mid-band)	_____ uv	_____ uv
Receive Sensitivity (____MHz)	_____ uv	_____ uv
Receive Sensitivity (____MHz)	_____ uv	_____ uv
PL Deviation	_____ Hz	_____ Hz
DTMF Deviation	_____ KHz	_____ KHz
Audio Deviation	_____ KHz	_____ KHz
Lowest usable Freq @ .5 Pwr	_____ MHz	_____ MHz
Highest usable Freq @ .5 Pwr	_____ MHz	_____ MHz



Frequency

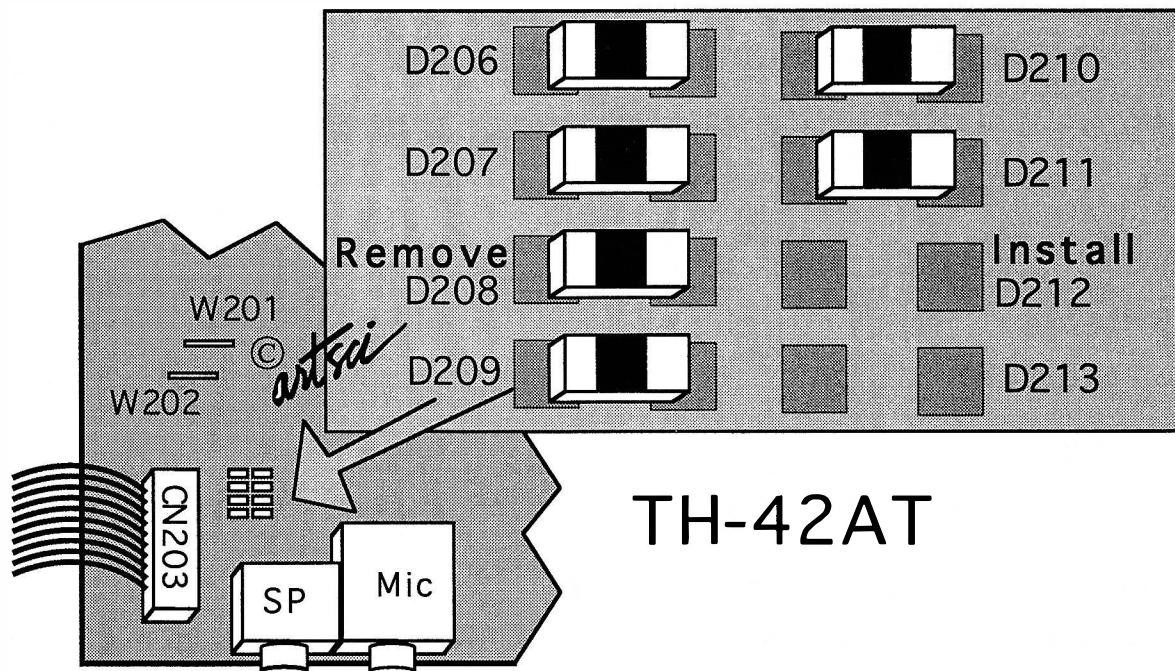


Frequency

KENWOOD TH-42AT

EXPANDED RF

1. Disconnect the battery and antenna.
2. Remove 2 long screws for the rear case.
3. Remove the control knobs from the top of the radio.
4. Remove the rubber top panel.
5. Separate the front and back halves. (Squeeze the bottom front panel)
6. Locate and **remove Diode D-208**. (Located on the front panel circuit board)
7. **Install the diode into location D-212**.
(Diodes D-210, D-211 & D-212 face the same direction)
8. Reassemble the radio
9. Reset the microprocessor (see owners manual)



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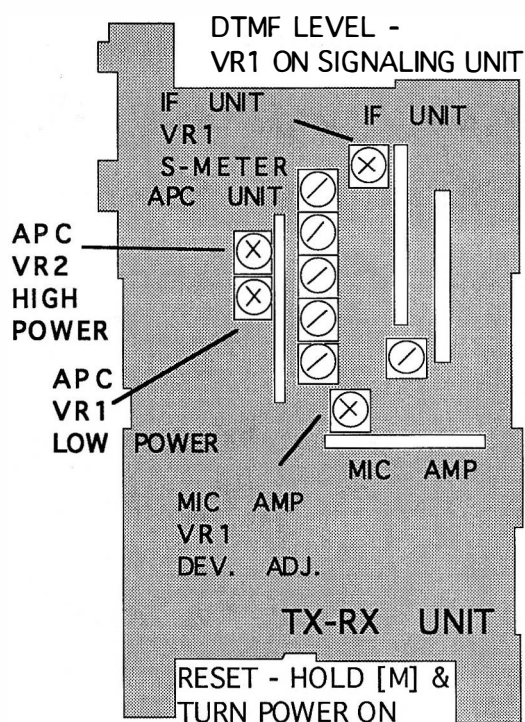
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KENWOOD TH-45AT

EXPANDED RF / ALIGNMENT CONTROLS

1. Disconnect the power and antenna.
2. Remove the volume, squelch and tuning control knobs
3. Remove the nuts from the volume control and tuning controls.
4. Remove screw located by the PTT switch.
5. Remove screw by the speaker jack
6. Remove two screws from the battery plate.
7. Carefully pull the front panel from the radio. Do not break any wires.
8. Gently lift the top panel from the radio by pulling it forward and then upwards.
The O ring on the BNC connector will cause some tension.
9. Rotate the top panel towards the front of the radio to expose the .75" X .75" board.
10. **Remove chip resistors R18 & R28.**
11. Reassemble the radio.
12. **RESET the CPU.** (Hold down [M] and turn power on.)



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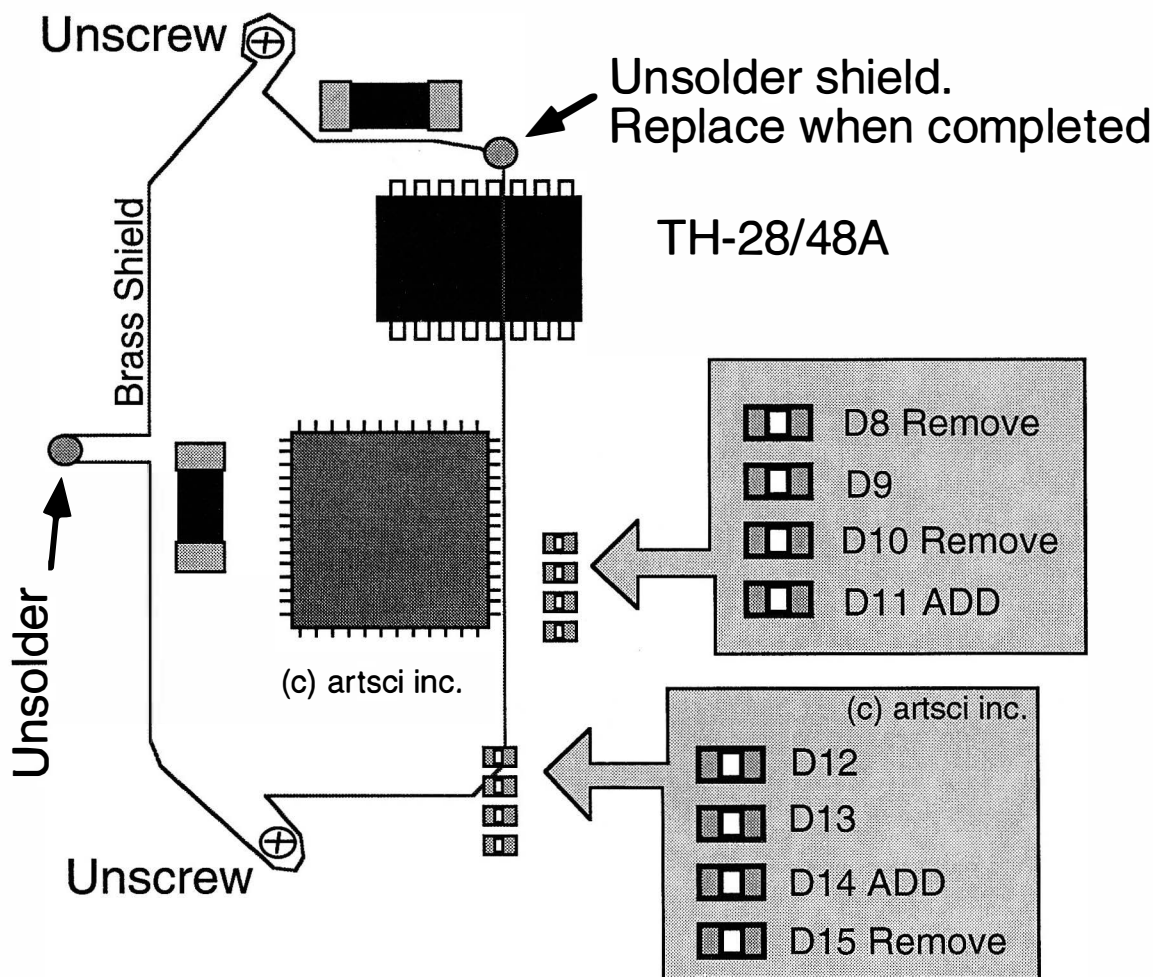
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KENWOOD TH-48A

EXPANDED RF

1. Disconnect the Power and antenna.
2. Remove case screws and open the radio.
3. Locate Brass Shield.
4. Unsolder the two solder tack point on the shield.
5. Remove the two screws holding the shield.
6. Locate chip diode positions D8.....D15.
7. **Remove Diode D8, D10 & D15.** (save the diodes)
8. **Install Diodes D11 & D14.** (used diodes removed in the previous step)
9. Replace the brass shield. (replace the screws and the solder tack points).
10. Reassemble the radio.
11. **Reset the microprocessor.** (PRESS AND HOLD [F] AND TURN POWER ON)



MORE --

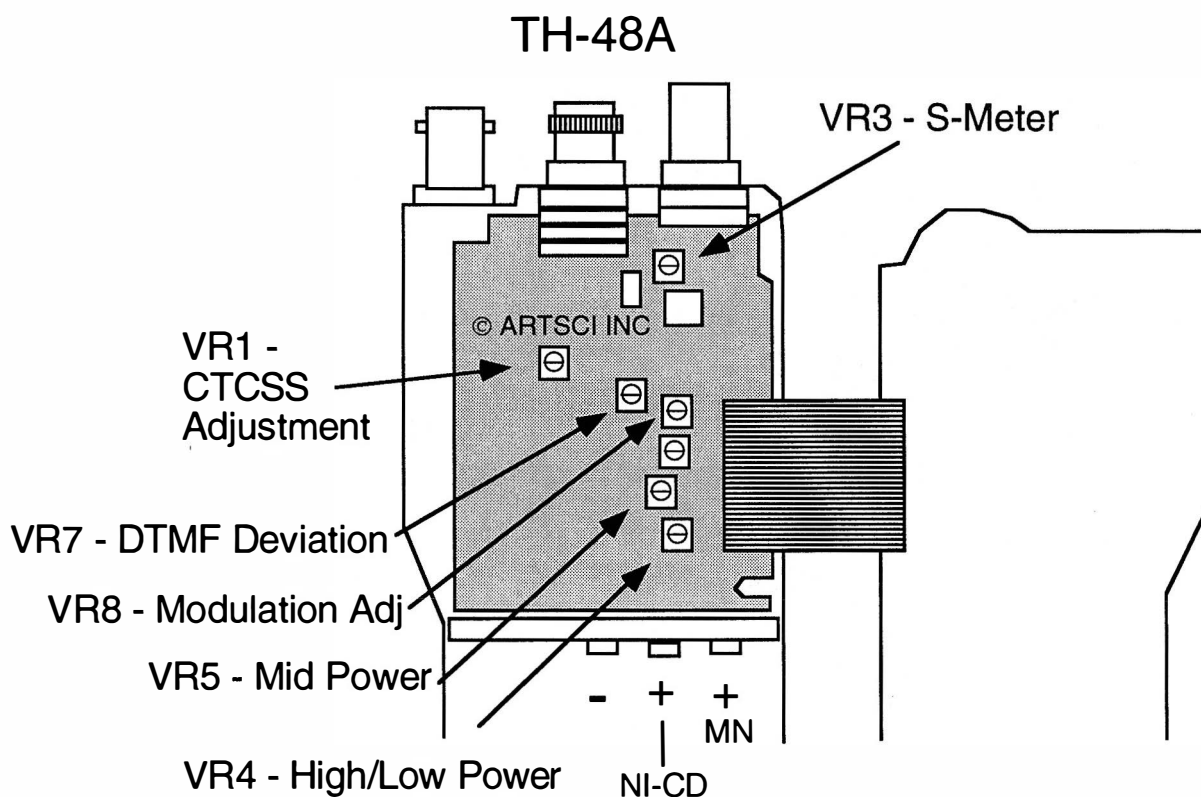
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KENWOOD TH-48A

ALIGNMENT POINTS



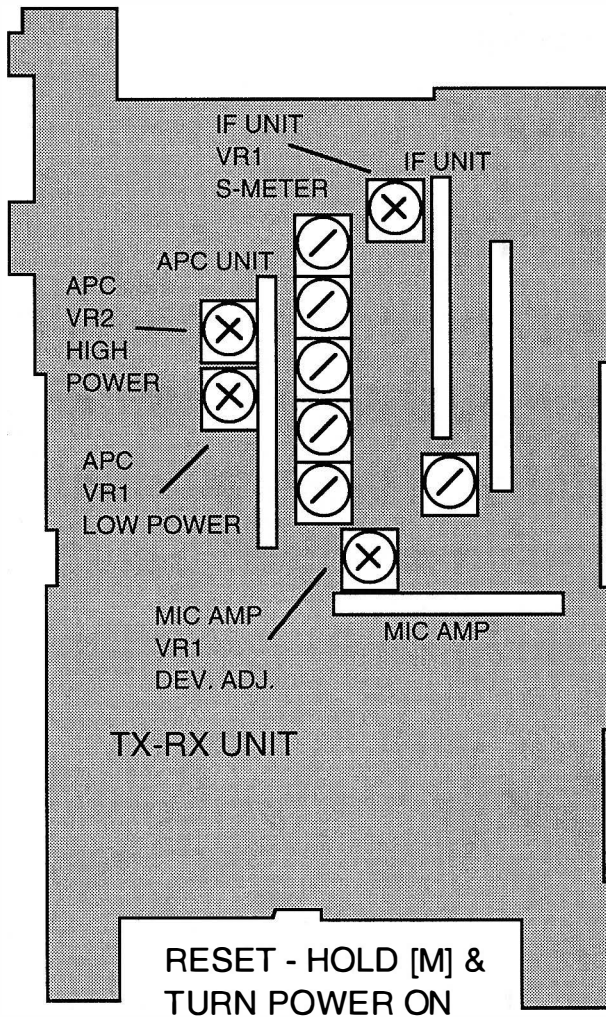
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KENWOOD TH-55A/AT

ADJUSTMENT CONTROLS



DTMF LEVEL -
VR1 ON SIGNALING UNIT

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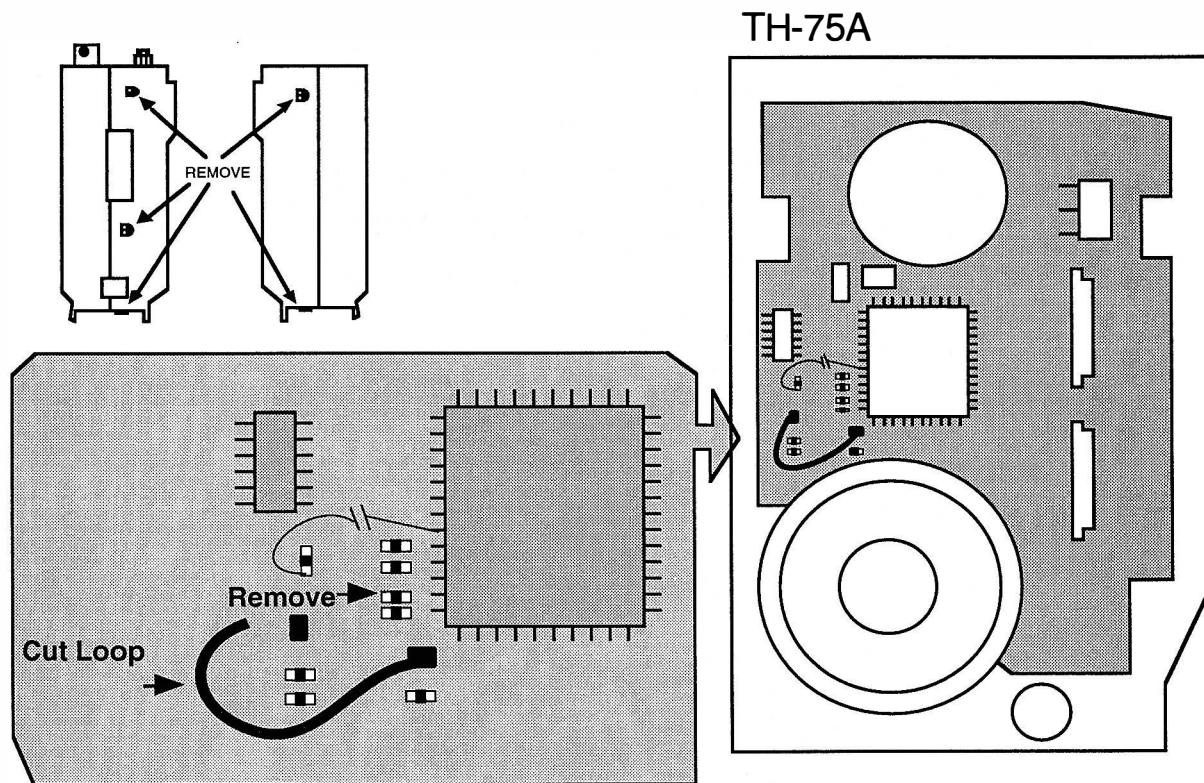
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KENWOOD TH-75A

EXPANDED RF

- 1 Disconnect the battery and antenna.
- 2 Remove the three case screws and two battery plate screws.
- 3 Lift front panel from radio. Do not disconnect flex cables.
- 4 **Cut the GREEN JUMPER WIRE**, located on left side of the CPU.
- 5 Remove the diode. (see drawing)
- 6 Reassemble the radio.
- 7 **RESET the CPU.** (Press and hold the M Key while turning on the radio.)



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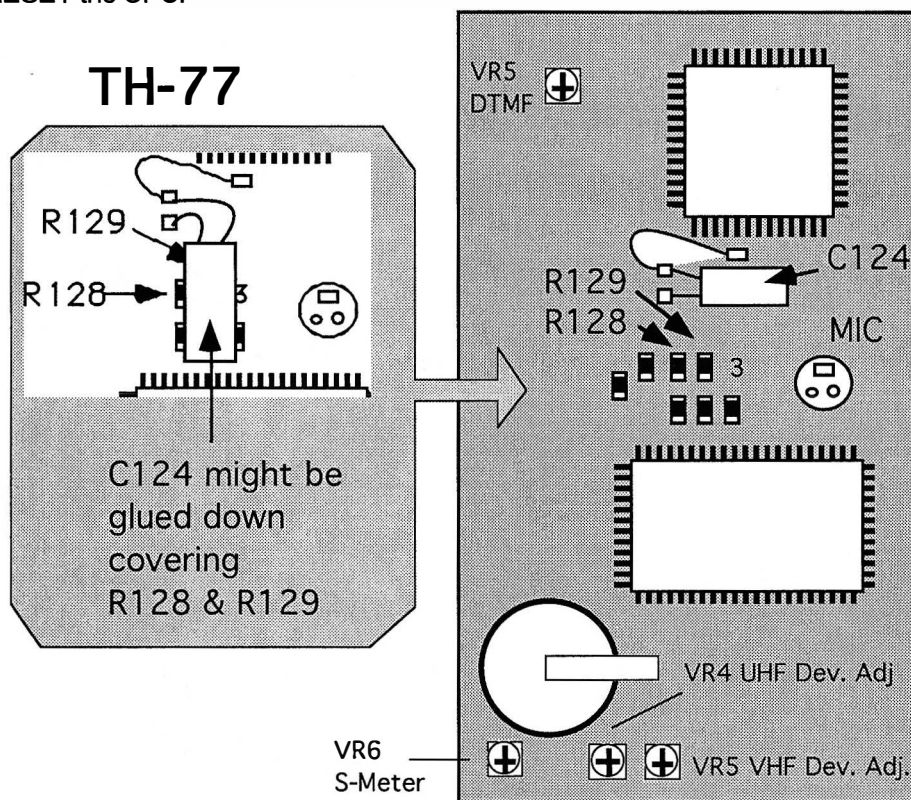
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KENWOOD TH-77A

EXPANDED RF & CROSS BAND REPEATER AM RECEIVE ON 118-136 MHz

1. Disconnect the battery and antenna.
2. Remove the three case screws and two battery plate screws.
3. Lift front panel from radio. Do not disconnect flex cables.
4. **Remove chip resistor R128 and R129.** Capacitor C124 may be glued down over these Resistors. You may wish to unsolder the capacitor to avoid tearing the flex board foil traces.
5. Reassemble the radio.
6. RESET the CPU.



AM sensitivity is typically less than 1uV for 10db S+N/N.

CROSS BAND OPERATING PROCEDURES

Turn on /off the Repeater mode : Press and hold the [SUB UP] key and turn the power on.

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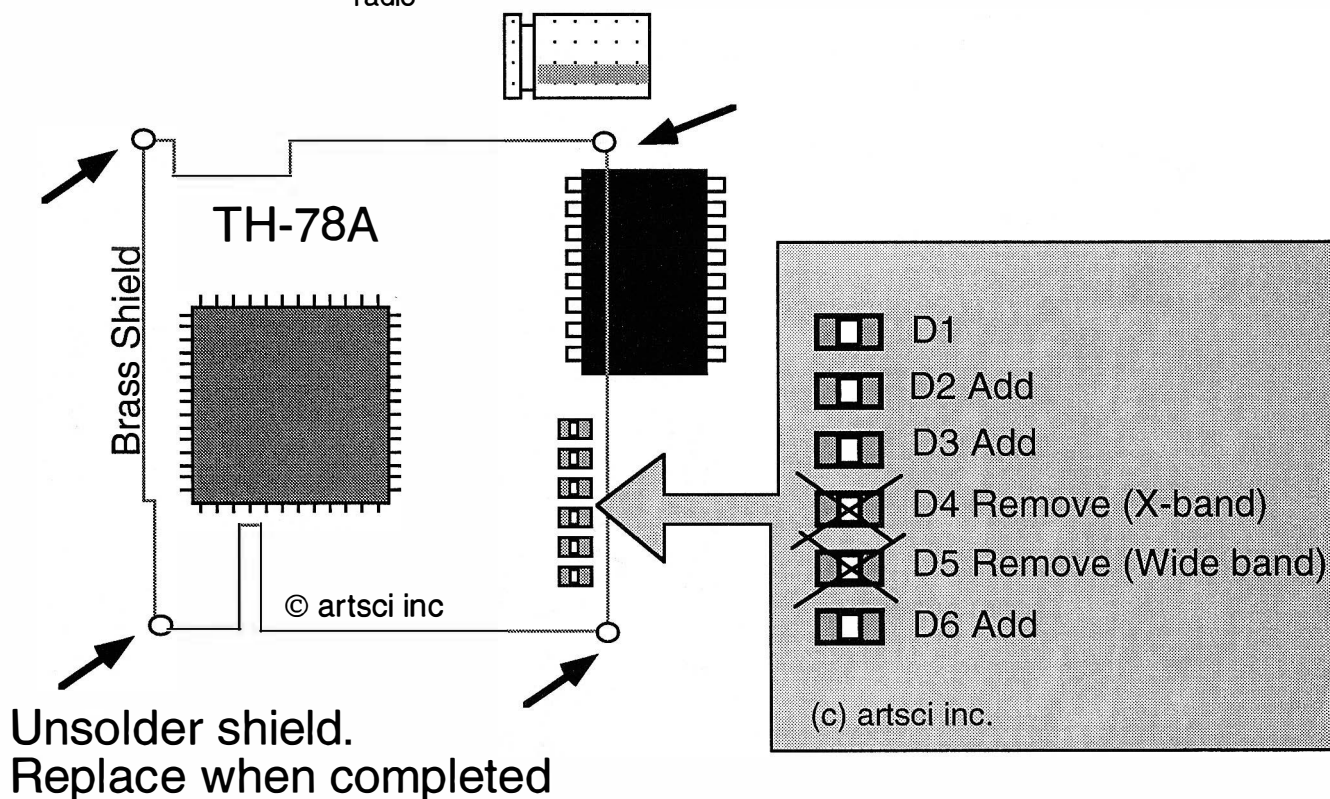


KENWOOD TH-78A

EARLY MODEL - EXPANDED RF

1. Disconnect the battery and antenna.
2. Remove 4 screws (3 on back & 1 on left side) and open the case.
3. Locate and remove the Brass Shield. (4 solder points)
4. Locate Diode position D1.....D6. (part # MA110 or 1SS355)
5. **Install a chip diode in position D2, D3 & D6.** (Present in USA versions)
6. **Remove chip diode D5.** (Expanded RF)
7. **Remove chip diode D4.** (Cross band mod)
8. Reassemble the radio. (Be careful of the small O-rings sealing the two LED's)
9. **Reset the Microprocessor.** (see user manual).

NOTE: TO SELECT 300 & 800 MHz. IN 440: PRESS [F] KEY FOR 2 SECONDS THEN [BAND].
 Radio's with Serial Numbers starting with a "6" have no 800 MHz RX.
 TO TURN ON/OFF CROSS BAND REPEATER FUNCTION: PRESS [F] & [0].
 TO CLONE RADIOS: Press & hold [F] [0] [Power] for 2 seconds. Press PTT on master radio



MORE ---



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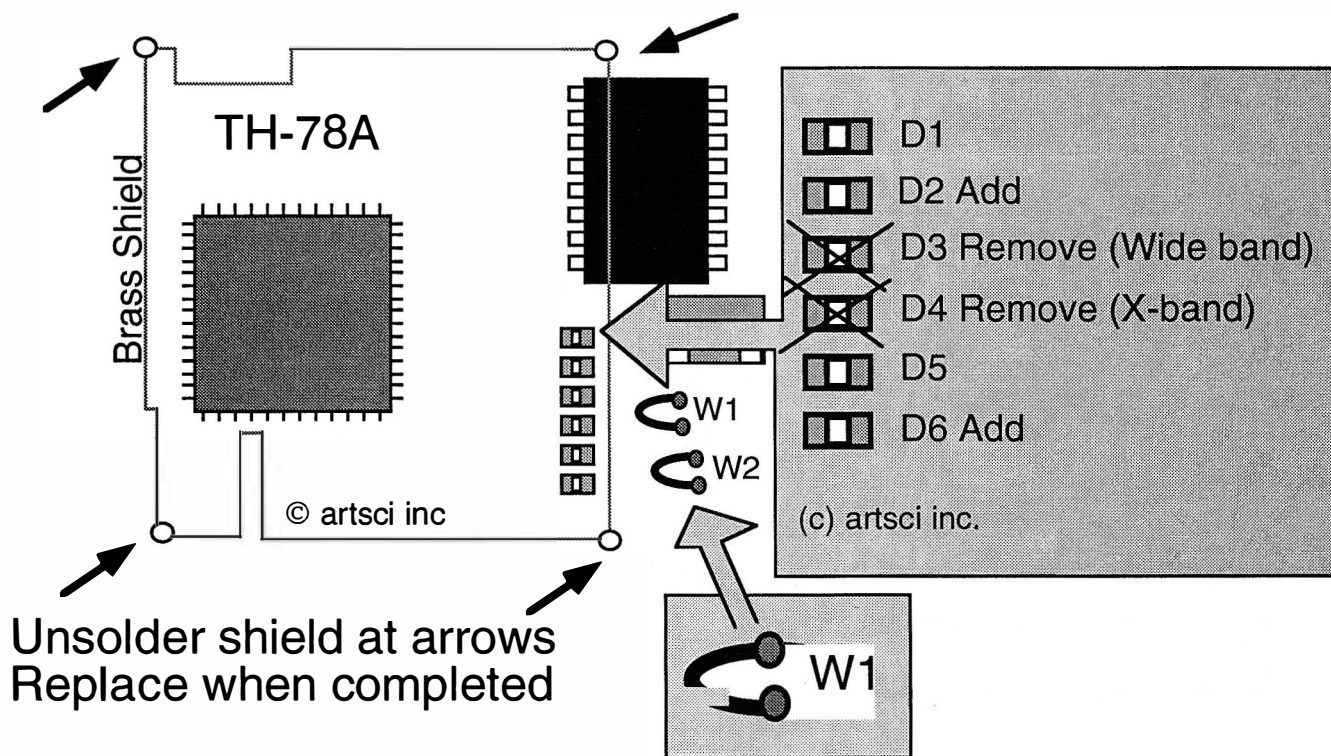
KENWOOD TH-78A

LATER MODEL(WITH GREEN JUMPERS) - EXPANDED RF

136 - 174 MHz TX / 400 -490 MHz TX

1. Disconnect the battery and antenna.
2. Remove 4 screws (3 on back & 1 on left side) and open the case.
3. Locate and remove the Brass Shield. (4 solder points)
4. Locate Diode position D1.....D6.
5. **Locate and cut W1.**
6. **Remove chip diode D3.** (Expanded RF)
7. **Remove chip diode D4.** (Cross band mod)
8. Reassemble the radio. (Be careful of the small O-rings sealing the two LED's)
9. **Reset the Microprocessor.**
(Press & hold [M] key & turn on, Hold [M] until LCD clears).

NOTE: TO SELECT 300 & 800 MHz. IN 440: PRESS [F] KEY FOR 2 SECONDS THEN [BAND].
Radio's with Serial Numbers starting with a "6" have no 800 MHz RX.
TO TURN ON/OFF CROSS BAND REPEATER FUNCTION: PRESS [F] & [0].
TO CLONE RADIOS: Press & hold [F] [0] [Power] for 2 seconds. Press PTT on master radio



MORE ---

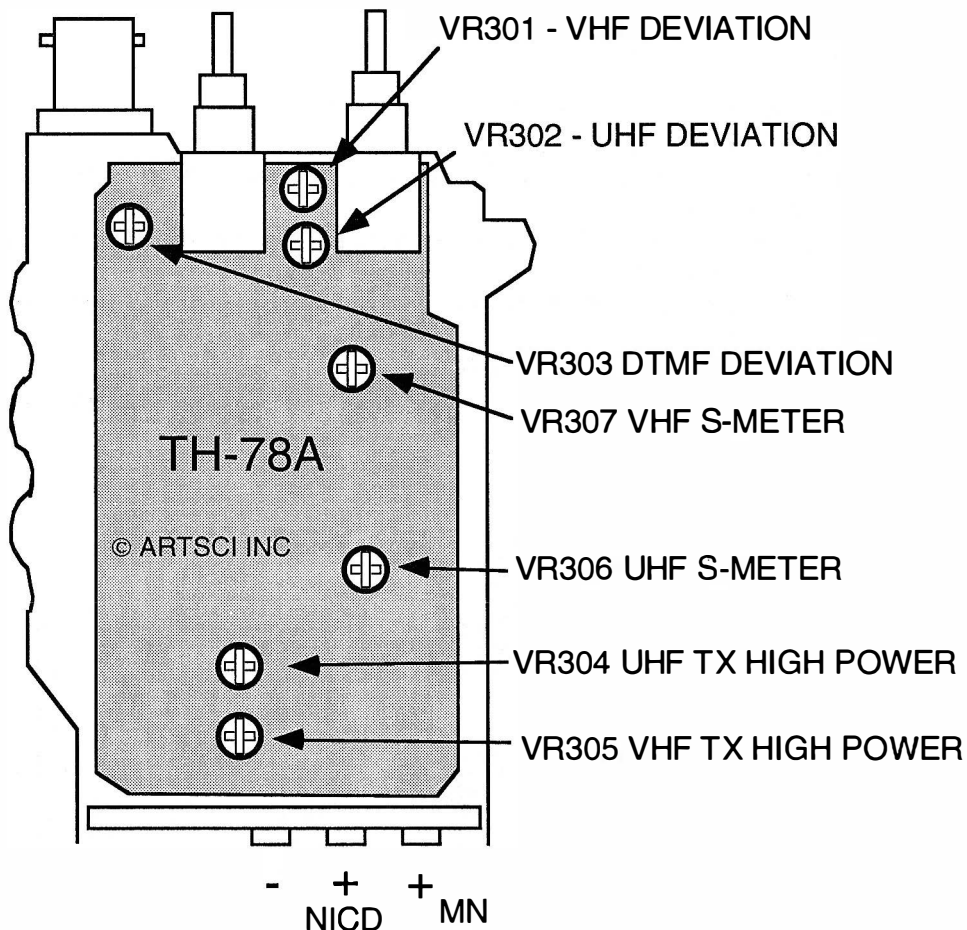
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KENWOOD TH-78A

ALIGNMENT POINTS



SIMON GAME - PRESS [M] & PTT & TURN ON. DISPLAY WILL PROMPT "PRESS ANY KEY".

AFTER 20 SIMON POINT- BLACK JACK WILL START



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KENWOOD TH-79

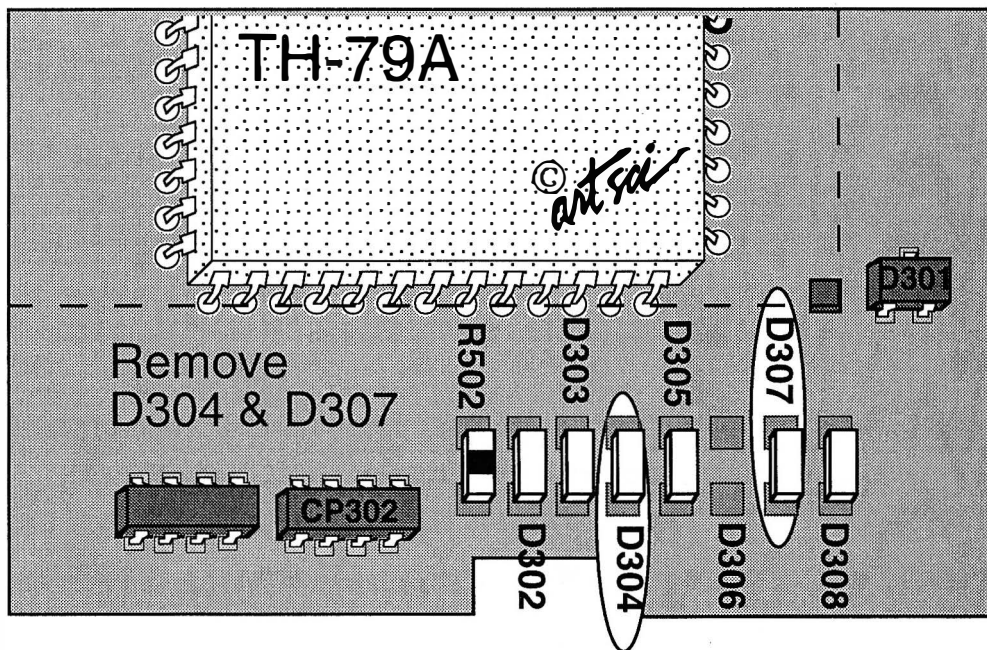
EXPANDED RF

RX: 67 - 179.995 MHz & 400 - 511.995 MHz

TX: 136 - 179.995 MHz & 400 - 511.995 MHz

1. Disconnect the battery and antenna.
2. Remove three screws from the back of the radio.
3. Remove one screw from the side under the Speaker/Mic/Power jacks rubber cover.
4. Remove the CTCSS access cover.
5. Squeeze the bottom side panel where the battery inserts to release the locking hooks.
6. Separate the two halves of the radio.
7. Locate and **remove Diodes D304 & D307** (located on the back of the front panel).
8. Reassemble the radio.
9. Reset the microprocessor (see owners manual)

Note Jumper W301 is for MARS/CAP expansion only.



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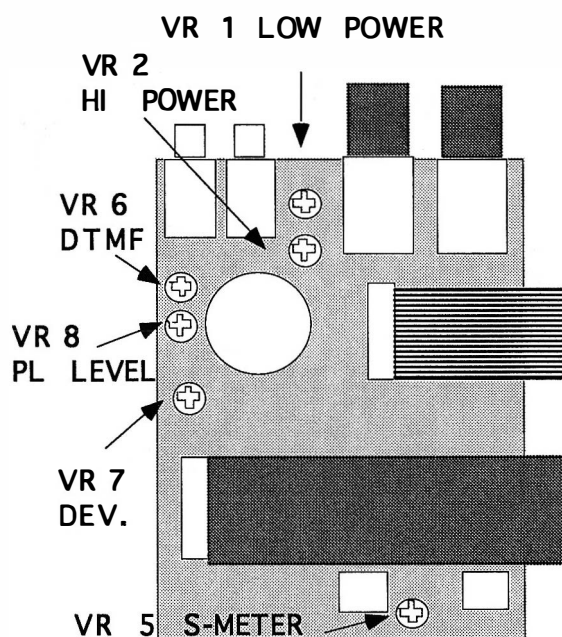
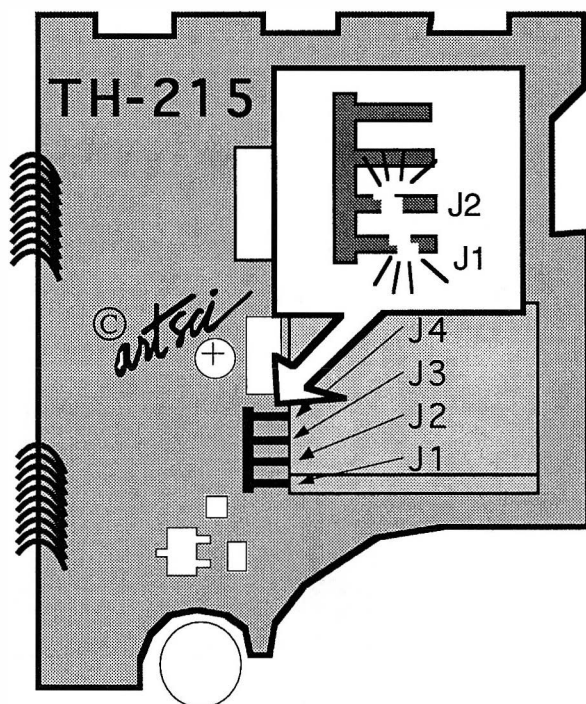
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KENWOOD TH-215

EXPANDED RF M/C / ALIGNMENT CONTROLS

1. Disconnect the power and antenna.
2. Remove the 4 screws from the back panel.
3. Carefully lift the front panel from the radio. Do not disconnect the flex cables.
4. **CUT Jumpers J1 and J2.**
5. Reassemble the radio.
6. **RESET the CPU.** (Press and hold [F] & [ENTER] and turn power on)



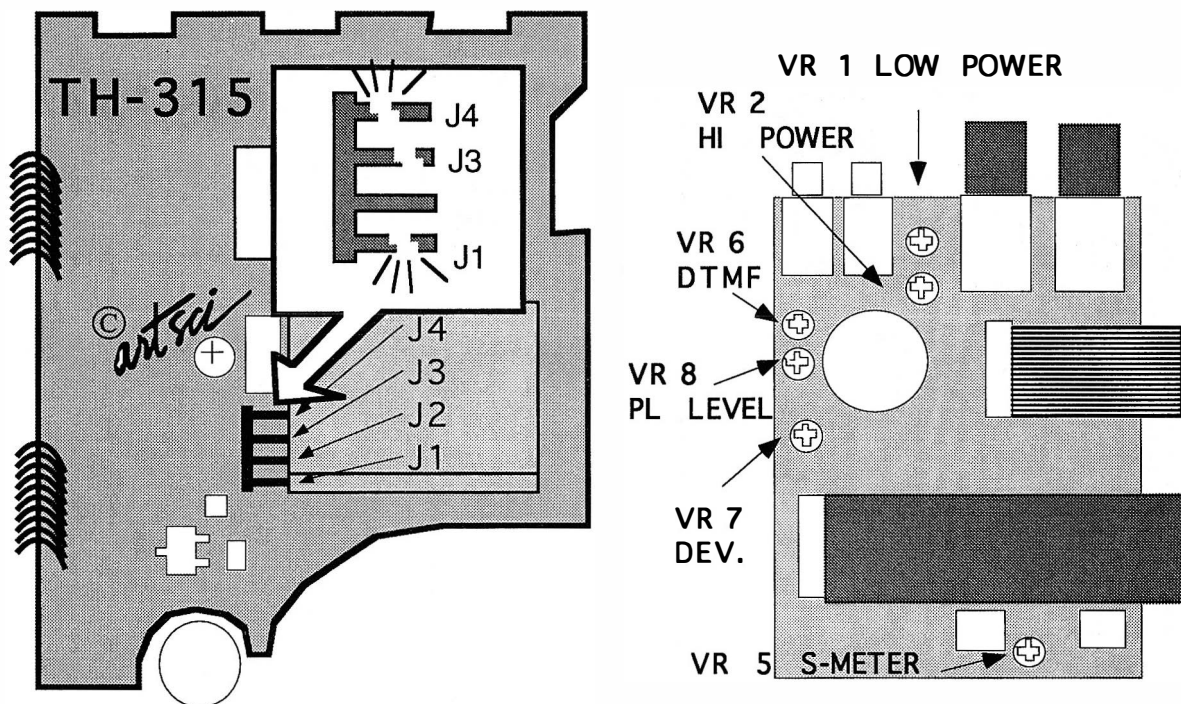
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KENWOOD TH-315

EXTENDED RF / ALIGNMENT CONTROLS

1. Remove battery and antenna.
2. Remove the screws holding the radio together.
3. Locate the Digital Circuit board (A02-076X-05)
4. **Cut Jumpers 1, 3 and 4**
5. Reassemble the radio.
6. **Reset the microprocessor.**(Press and hold [F] & [ENTER] and turn power on)



Range : 215.000 - 229.995 MHz

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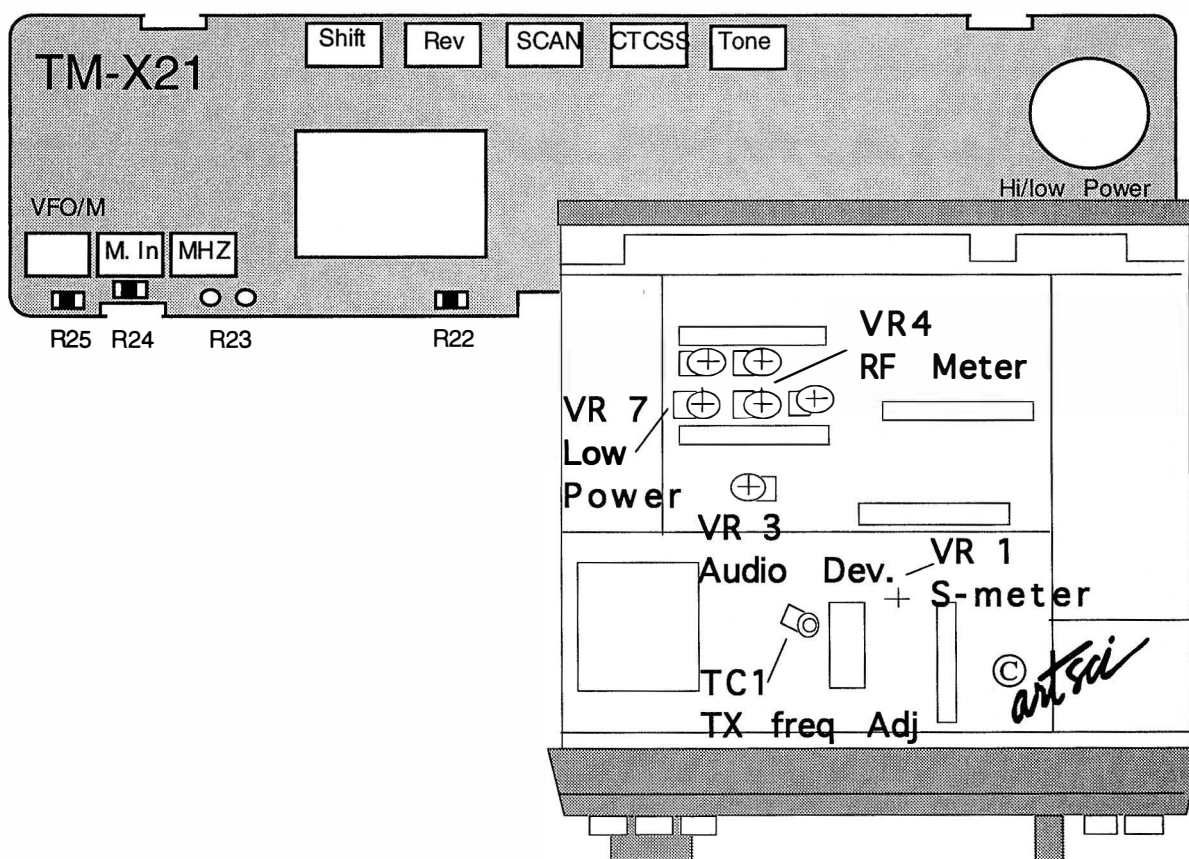
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KENWOOD TM-221

EXPANDED RF M/C / ALIGNMENT CONTROLS

1. Disconnect the power and antenna.
2. Remove the top and bottom covers.
3. Locate the control unit (X53-3040-XX). It is the board closest to the front.
4. **Remove R25 and place it in the position of R24.**
5. Reassemble the radio.
6. **RESET the CPU.** (Press and hold [VFO/M] & [M.IN] and turn power on)



TX Range 142 MHz - 154 MHz



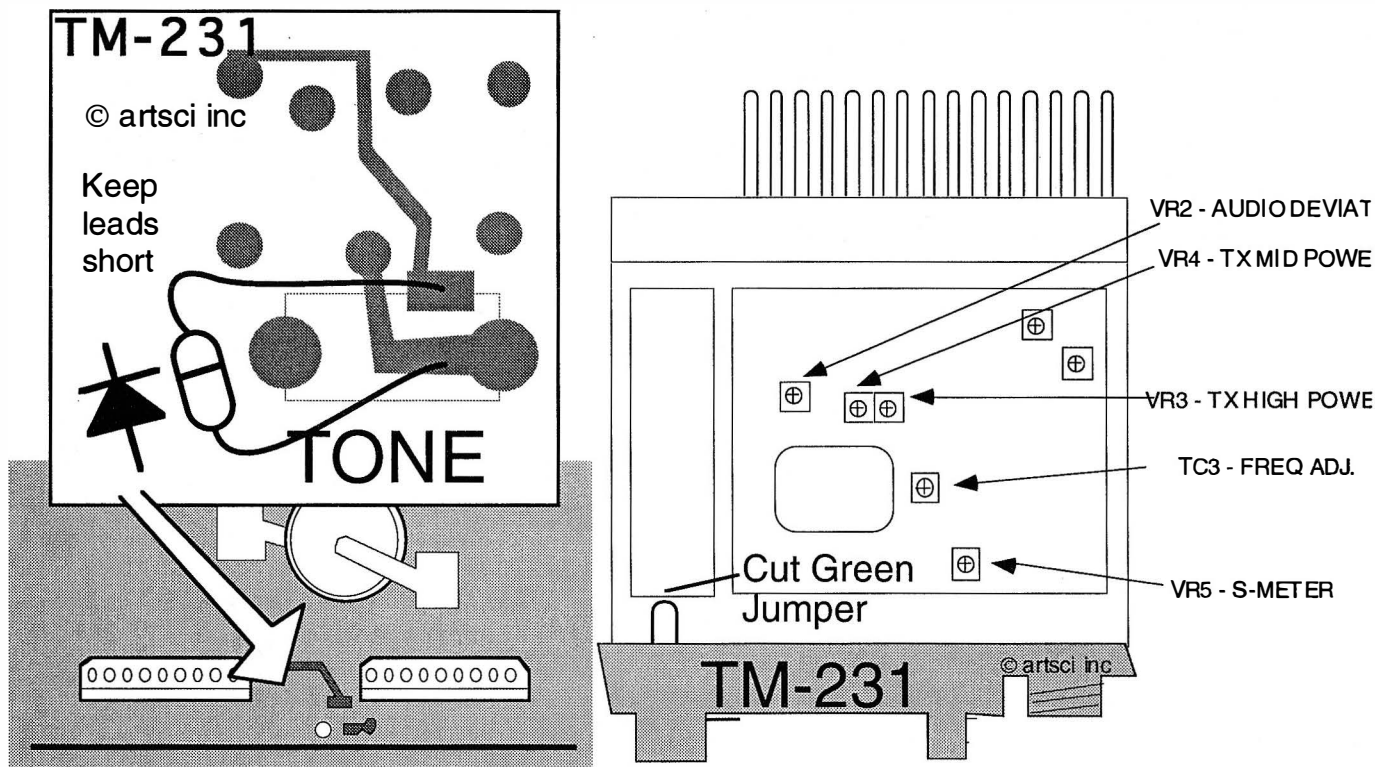
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KENWOOD TM-231A

EXPANDED RF M/C / ALIGNMENT CONTROLS

1. Disconnect the power and antenna.
2. Remove the top and bottom cover.
3. Remove all knobs from the front panel.
4. Remove the nut from the mic jack and the nut from the channel switch.
5. Remove four screws holding the front panel.
6. Remove the three screws from the control board.
7. Locate the green jumper wire sticking out the front panel, behind the VFO button
8. **Cut the green jumper** and tape the edges to prevent them from shorting.
9. **Install diode D209** Part # MA141A on control board X57-3310-11.
10. Reassemble the radio
11. **Reset the microprocessor.** (Press and hold [MR] while turning on the power)



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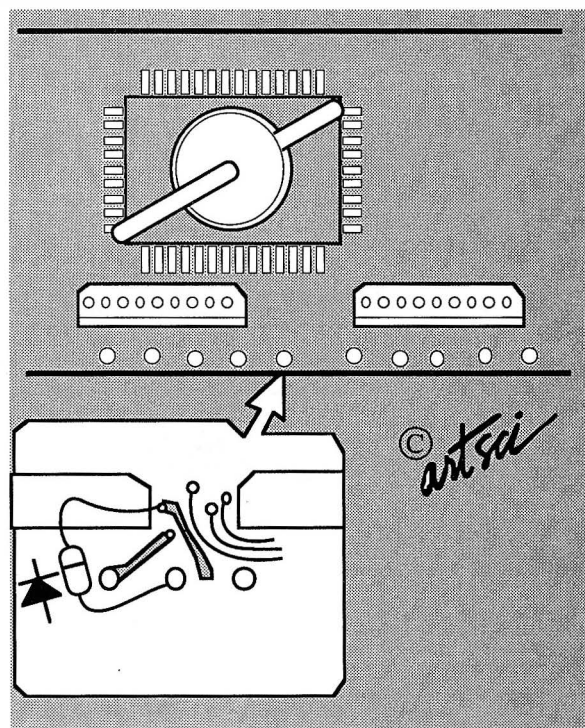
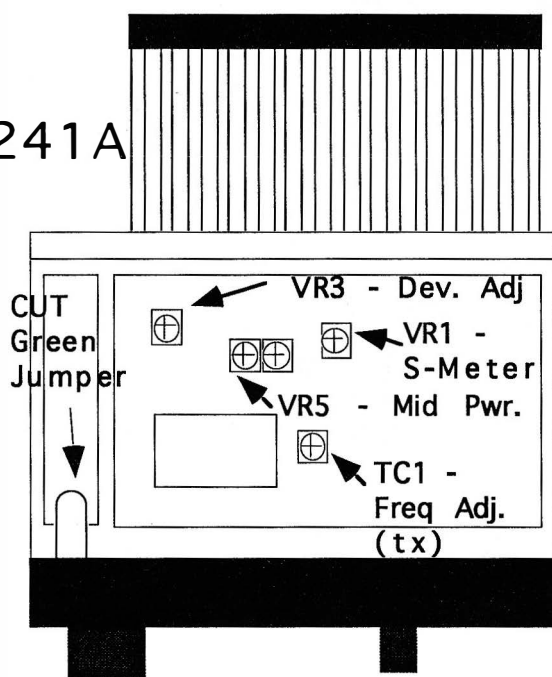


KENWOOD TM-241A

EXPANDED RF M/C
138 - 152 MHz RX/TX

1. Disconnect the power and antenna.
2. Remove the top and bottom cover.
3. Remove all knobs from the front panel.
4. Remove the nut from the mic jack and the nut from the channel switch.
5. Remove four screws holding the front panel.
6. Remove the three screws from the control board.
7. Locate the green jumper wire on the control board.
8. **Cut the green jumper** and tape the edges to prevent them from shorting.
9. **Install chip diode D209** or a 1N914 on control board Part # MA141A.
The control board is located on the front panel (Control knobs must be removed.)
10. Reassemble the radio
11. **Reset the microprocessor** (Press and hold [MR] while turning on the power)

TM-241A



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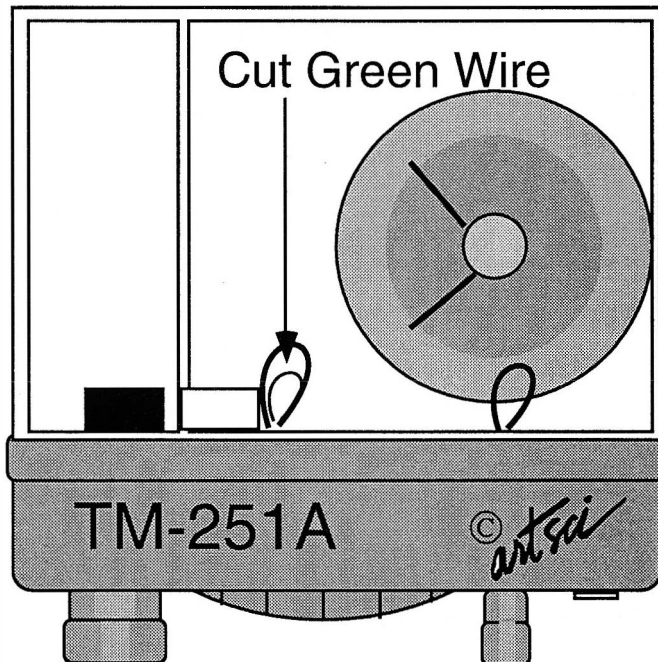
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KENWOOD TM-251A

EXPANDED RF - MARS/CAP
142.000 MHz - 151.995 MHz

1. Disconnect the power and antenna.
2. Remove the top cover.
3. Locate and **cut GREEN Jumper wire** (see drawing).
4. Reassemble the radio.
5. Reset Microprocessor (Press and hold [MR] & turn power on)



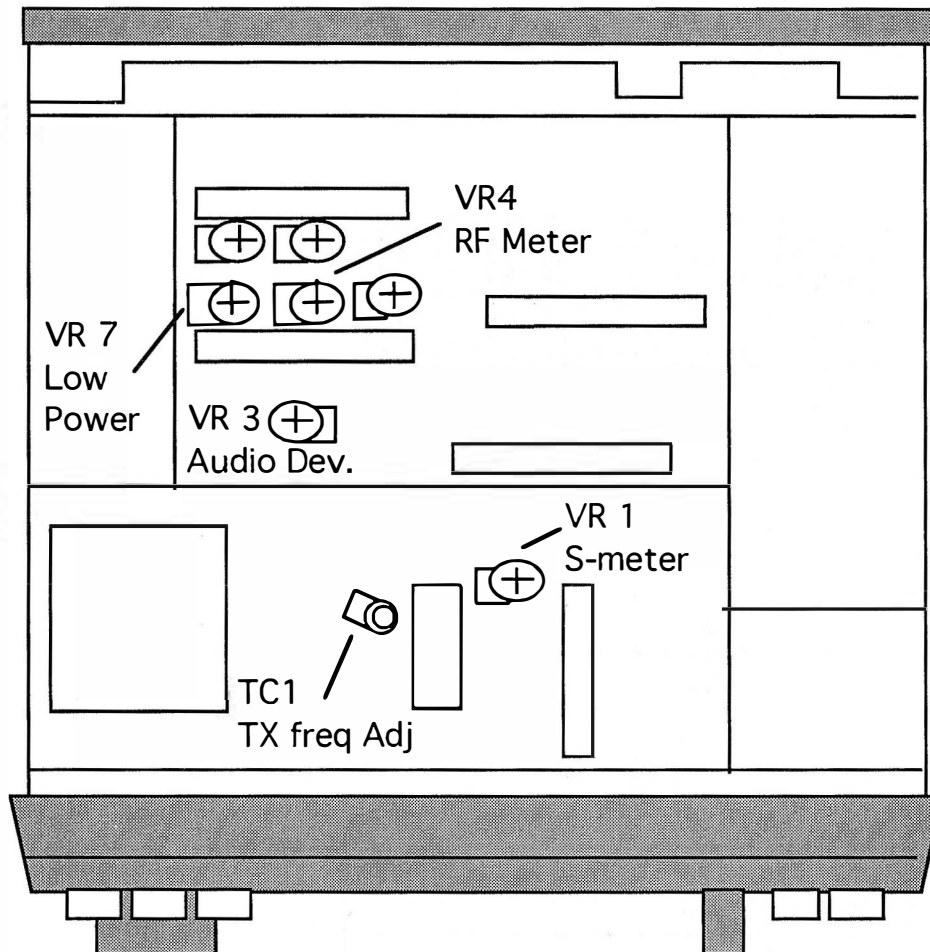
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KENWOOD TM-321A

ADJUSTMENT CONTROLS



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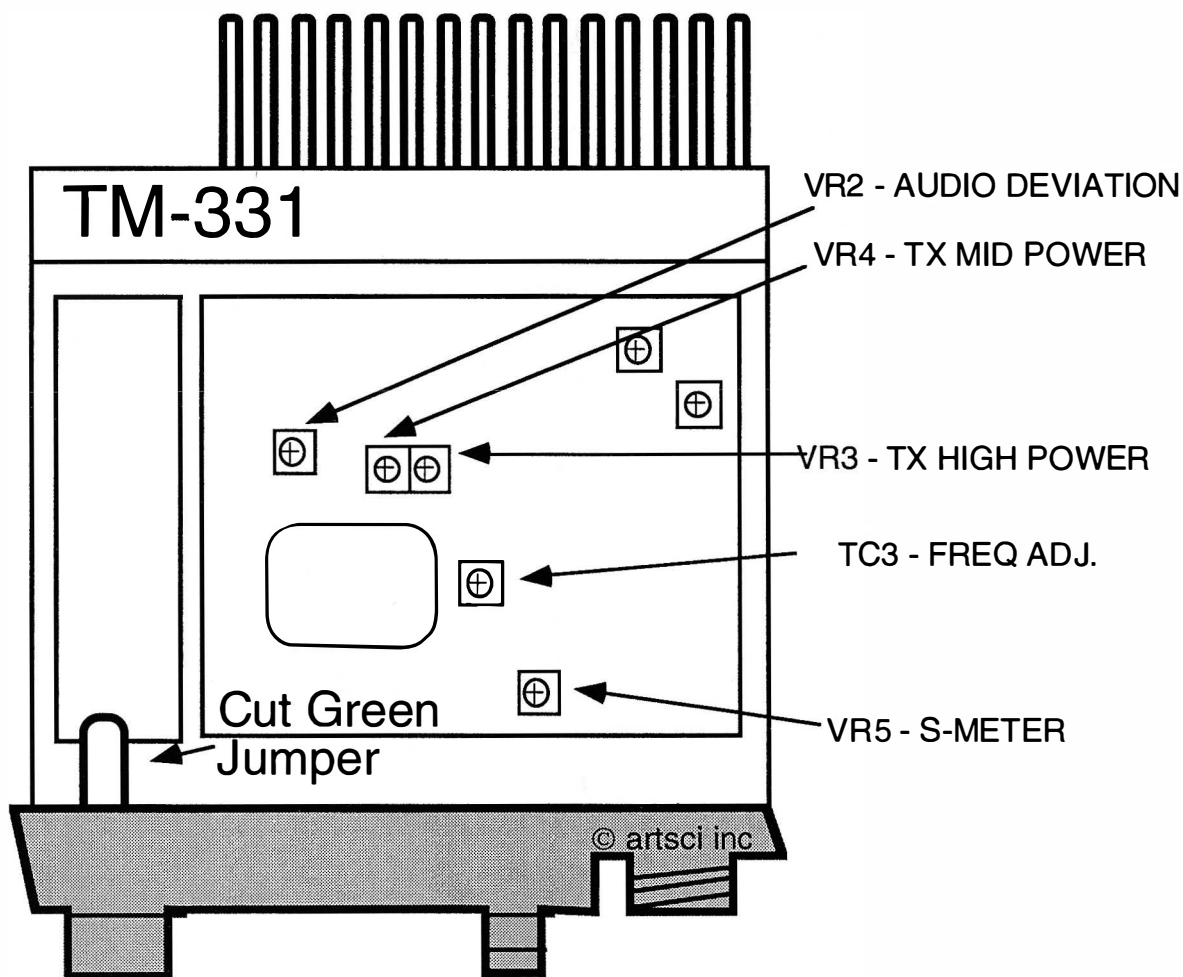
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KENWOOD TM-331A

EXTENDED RF / ALIGNMENT CONTROLS
NEW TX/RX RANGE (215 - 229 MHz)

1. Remove power and antenna.
2. Remove top cover.
3. **Locate and cut Green jumper.**
4. Reassemble the radio.
5. **Reset the Microprocessor.** (Hold [MR] and turn power on)



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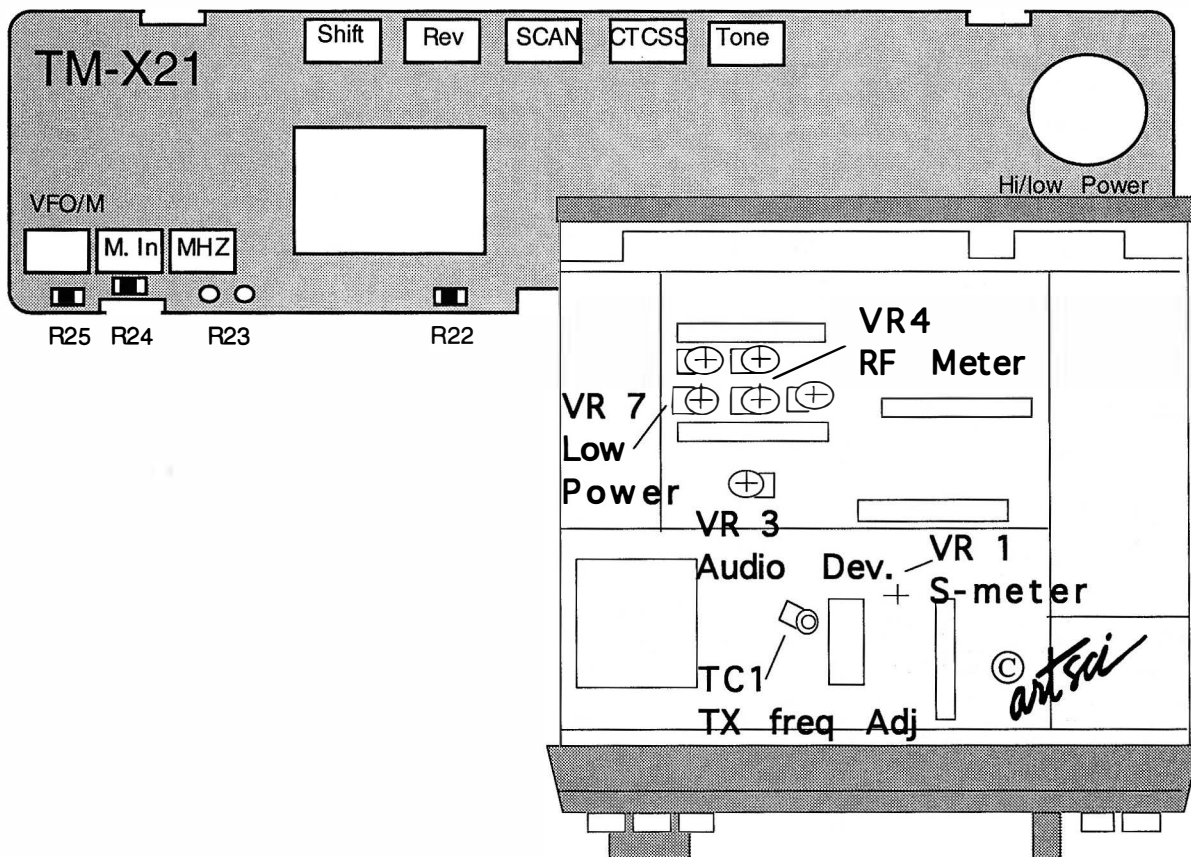
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KENWOOD TM-421A

EXTENDED RF / ALIGNMENT CONTROLS

1. Remove power and antenna.
2. Remove the top and bottom covers
3. Remove the channel knob
4. Remove the microphone ring.
5. Remove the volume and squelch knobs
6. Remove the front panel from the unit.
7. Remove the front control unit from the chassis.
8. Locate component side of the Control unit circuit board.
9. Locate chip Resistor R-25.
10. **Remove R-25 and place it in the empty position R-23.**
11. **Remove R-22.**
12. Reassemble the radio.
13. **Reset the microprocessor.**(Press and hold [MR] while turning on the power)



RESET : Press and hold [VFO/M] and [M.IN] and turn power on.



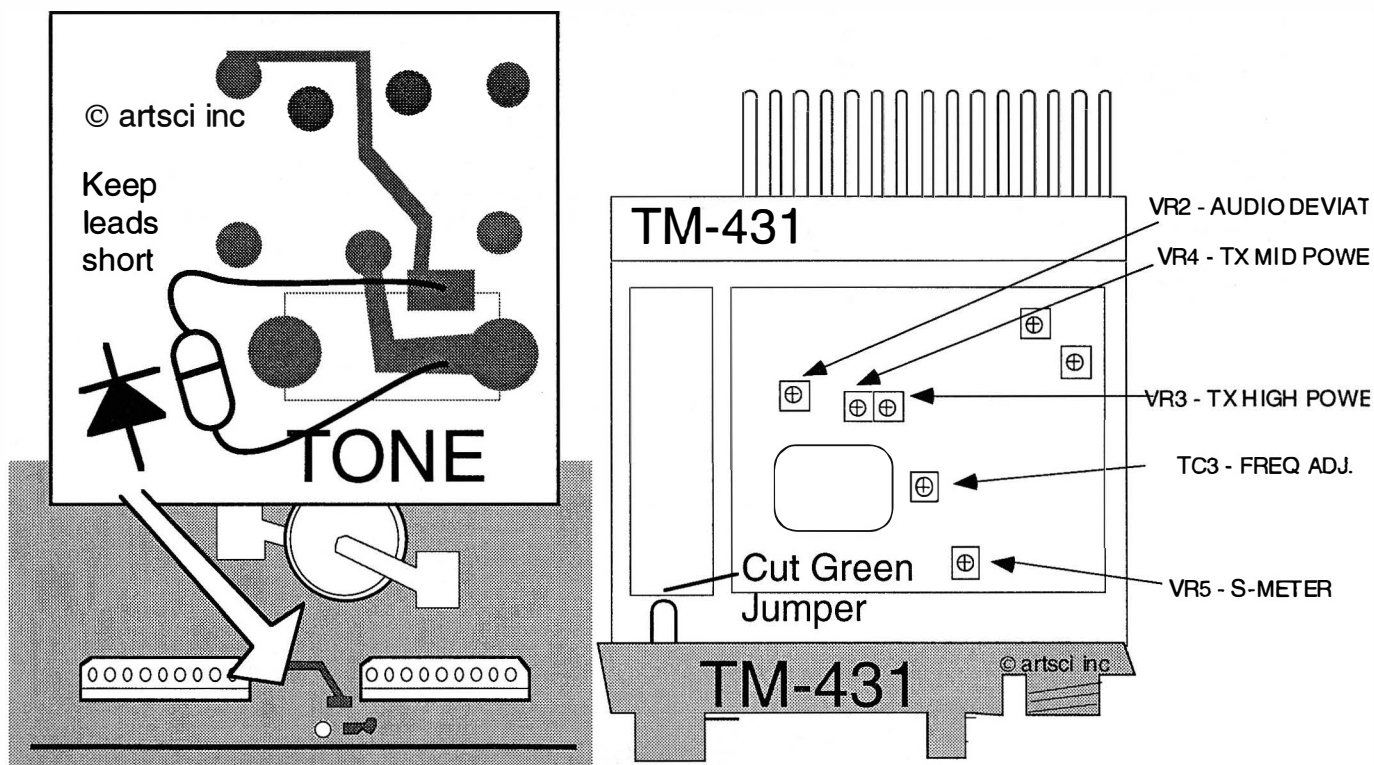
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KENWOOD TM-431A

EXPANDED RF M/C

1. Disconnect the power and antenna.
2. Remove the top and bottom cover.
3. Remove all knobs from front panel.
4. Remove the nut from the mic jack and the nut from the channel switch.
5. Remove four screws holding the front panel.
6. Remove the three screws from the control board.
7. Locate the green jumper wire sticking out the front panel, behind the VFO Button.
8. **Cut the green jumper** and tape the edges to prevent them from shorting.
9. **Install diode D209** Part # MA141A on control board or use a 1N914 as shown.
10. Reassemble the radio
11. **Reset the microprocessor.** (Press and hold [MR] while turning on the power)



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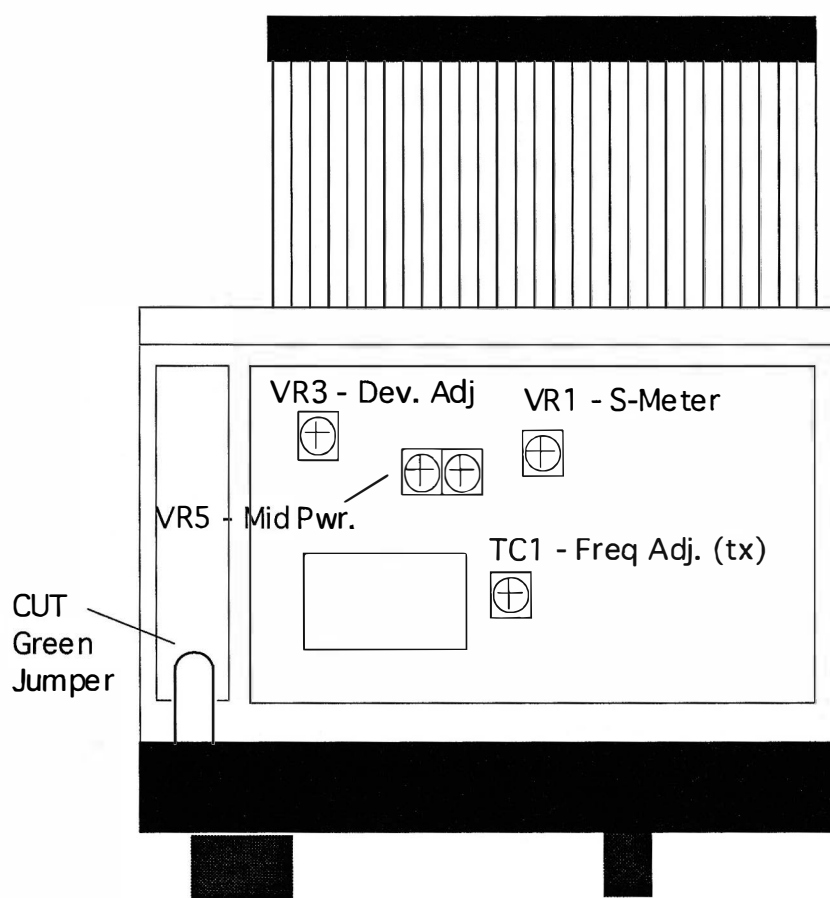
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KENWOOD TM-441A

EXPANDED RF M/C ALIGNMENT CONTROLS

1. Disconnect the power and antenna.
2. Remove the top and bottom cover.
3. Remove all knobs from front panel.
4. Remove the nut from the mic jack and the nut from the channel switch.
5. Remove four screws holding the front panel.
6. Remove the three screws from the control board.
7. Locate the green jumper wire on the control board.
8. **Cut the green jumper** and tape the edges to prevent them from shorting.
9. Reassemble the radio
10. **Reset the microprocessor.** (Press and hold [MR] while turning on the power)



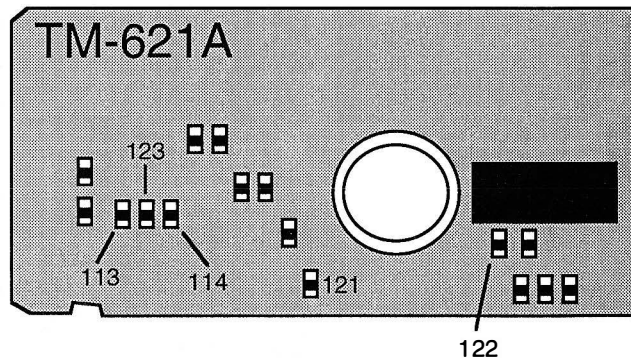
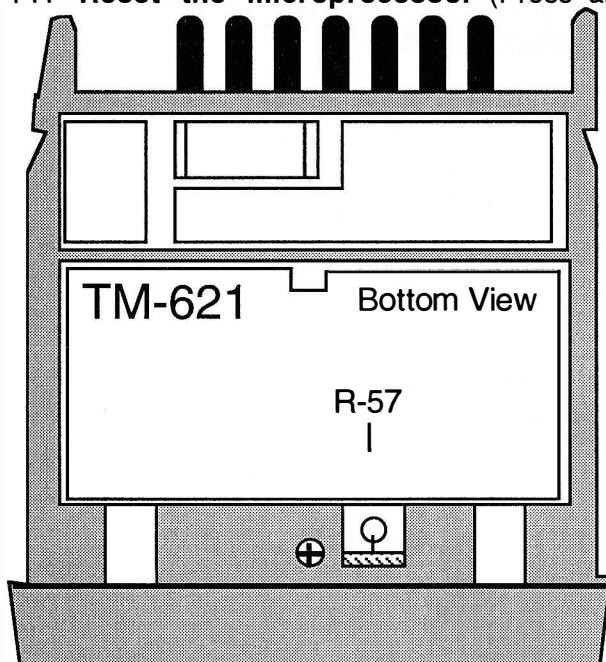
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KENWOOD TM-621A

EXPANDED RF / CROSS BAND REPEATER

1. Disconnect the power and antenna.
2. Remove the top and bottom covers.
3. Locate and cut R57 on Control board. (Bottom side of radio)
4. Remove the silver colored screws from the front panel.
5. Carefully pull the front panel away from the body of the transceiver.
6. Locate chip resistor R113 and R114 on the Control board. (inside front panel)
7. **Remove the chip resistor** located between R113 & R114. It is labeled R123.
8. **Remove chip resistor R121** (cross band repeater mod)
9. **Remove R122** (disable 3 minute time out timer).
10. Reassemble radio.
11. **Reset the microprocessor** (Press and hold [F] while turning power on).



CROSS BAND OPERATING PROCEDURES

The TM-621 will receive a signal on one band and will automatically re-transmit it on the other band. Each band can contain shift information.

Turn on / off the Repeater mode : Press F and then press A.B.C. Key. Three dots should appear in the display when the mode is on.

MORE ---

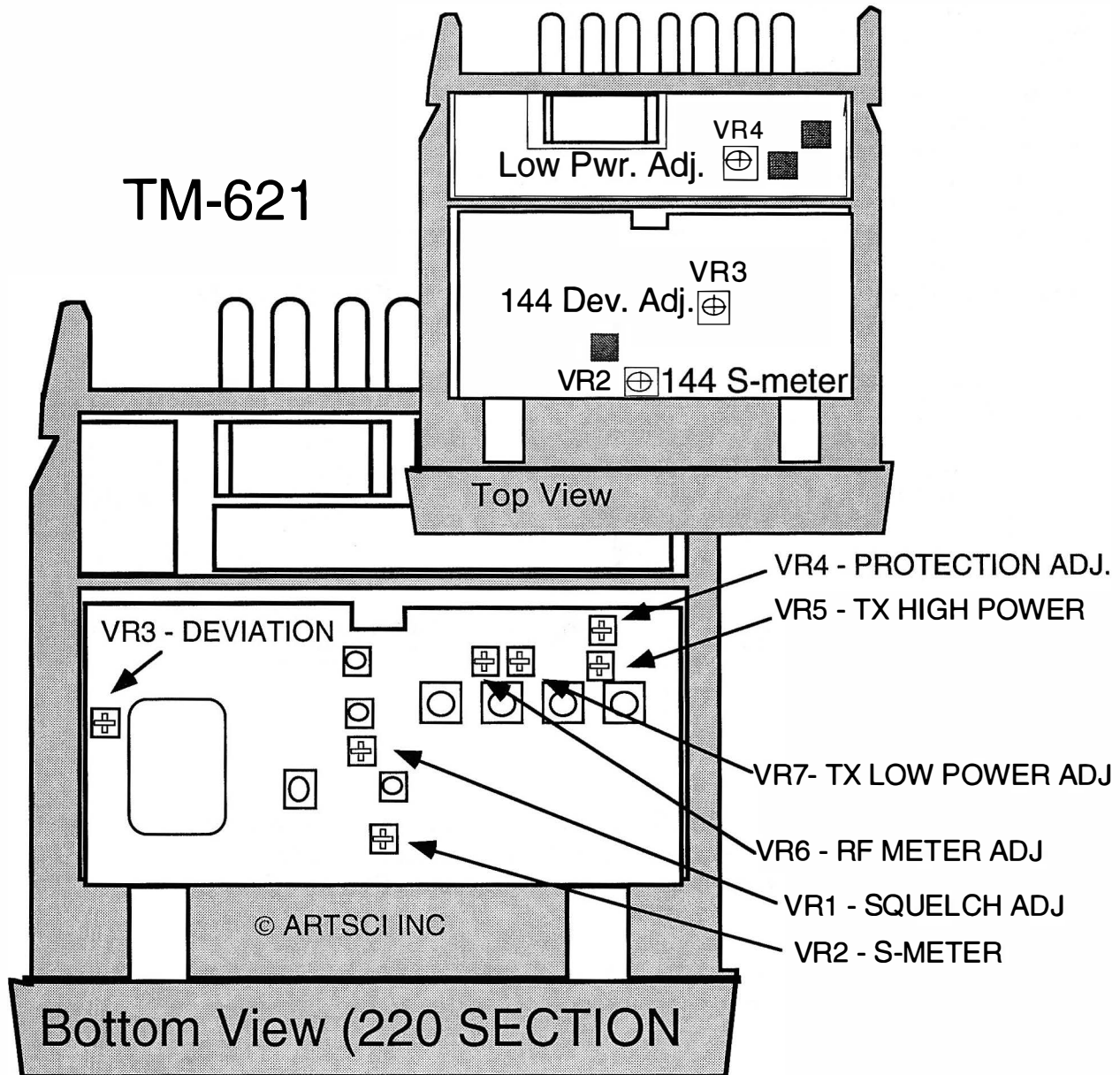
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KENWOOD TM-621A

ALIGNMENT CONTROLS



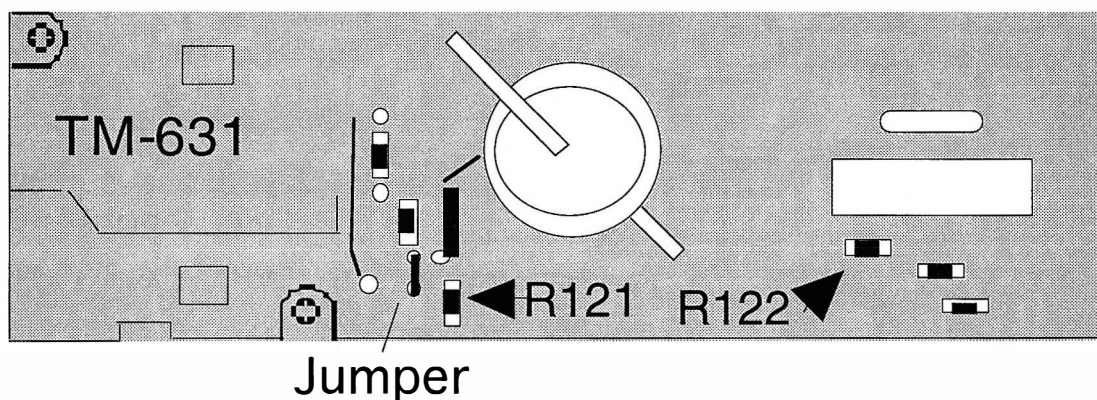
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KENWOOD TM-631

EXPANDED RF/ CROSS BAND REPEATER/ TIME OUT TIMER

1. Remove power and antenna and the top and bottom covers.
2. CUT RESISTOR R25. R25 is located on the Control unit on the bottom side of the Radio. The resistor can be seen by looking through the cutout of the chassis just behind the front panel.
3. Remove silver color screws from the front chassis. The screws are located 2 on each side, 1 on the top and 1 on the bottom.
4. Pull the front panel away from the radio. Do not unplug any cables.
5. **Install a jumper wire** see diagram 1. (Some models this will not work properly)
6. **Remove R121.** (This is the Cross band repeater mod.)
7. **Remove R122.** (This will override the automatic 3 minute time out timer)
8. Reassemble the radio.
9. **Reset the microprocessor twice.** Press and hold the [MR] key and turn radio on.



CROSS BAND OPERATING PROCEDURES: The TM-631 will receive a signal on one band and will automatically re-transmit it on the other band. Each band can contain shift information. Only one band may contain PL encode/decode information. Do not turn Tone and CTCSS on in one band.

Turn on / off the Repeater mode : Press [F] and then press [A.B.C.] Key.
Three dots should appear in the display when the mode is on.

MORE ---

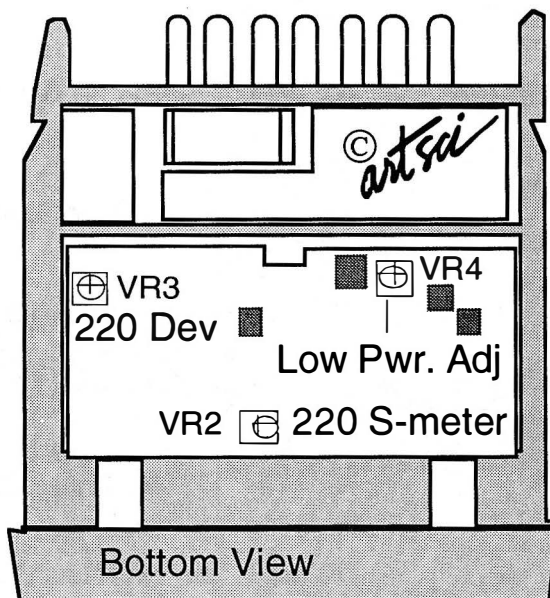
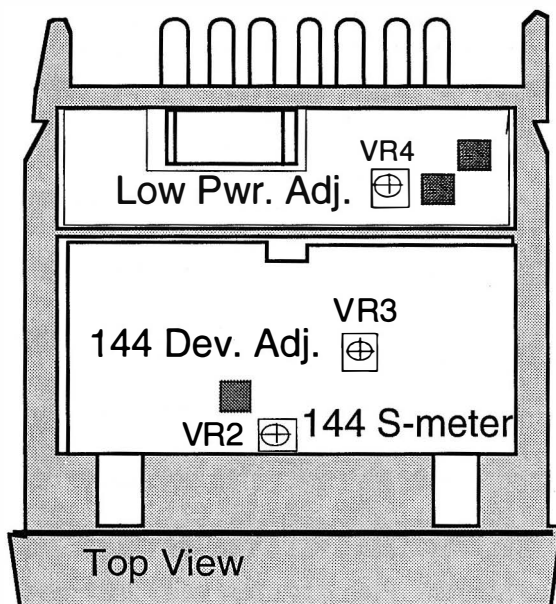
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KENWOOD TM-631

ALIGNMENT POINTS



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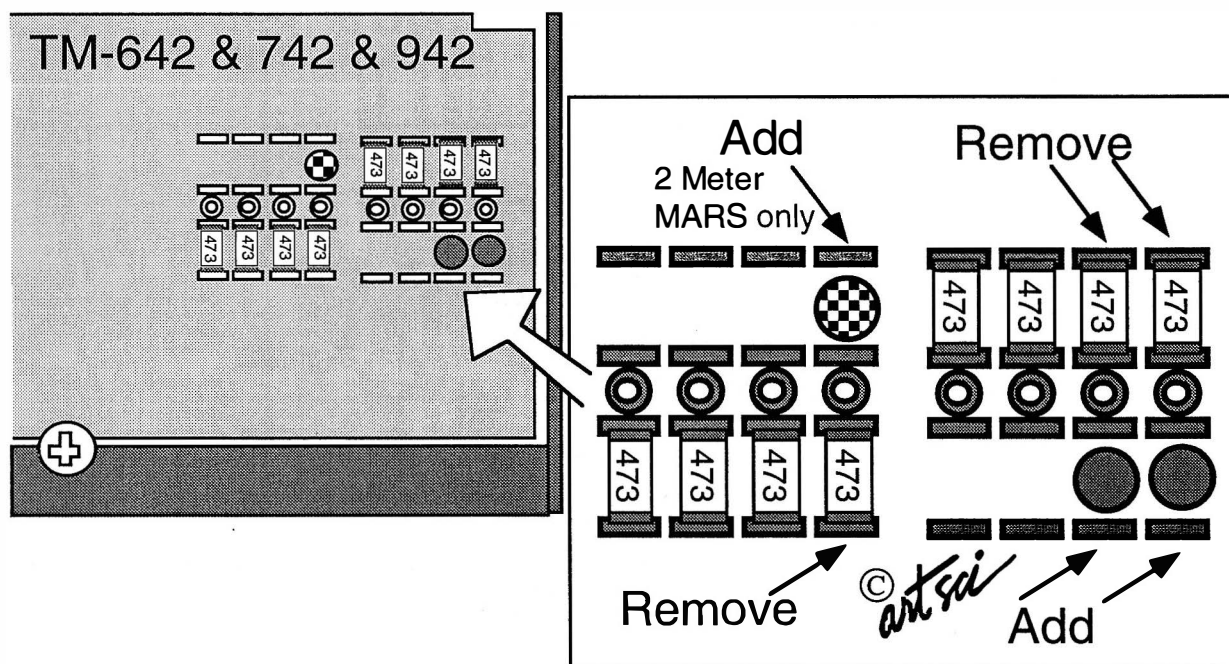
KENWOOD TM-642

EXPANDED RF

(28 MHz - 18-54 RX/26-45 TX)
 (50 MHz - 40-90 RX/46-76 TX)
 (144 MHz - 136-184 RX/TX)
 (220 MHz - 215-260 RX 215-235 TX)
 (440 MHz - 410-470 RX/TX)
 (1.2 GHz - 1100 - 1400 RX/TX)

1. Remove power and antenna.
2. Remove the front panel from the main body.
3. Remove the 4 screw on the bottom cover.
4. Loosen the 4 screws on the side of the radio.
5. Locate the control unit (the large board near the front panel area).
6. **Remove chip resistors** as indicated below (You will be using them in the next step).
7. Reassemble the radio.
8. **Reset the microprocessor** (Press and hold the [MR] key and turn power on)

For 800 RX :press and hold [MHz] for 1 second. An 800 MHz antenna should be connected to the copper pad of IC9 Pin 1 on UHF board.



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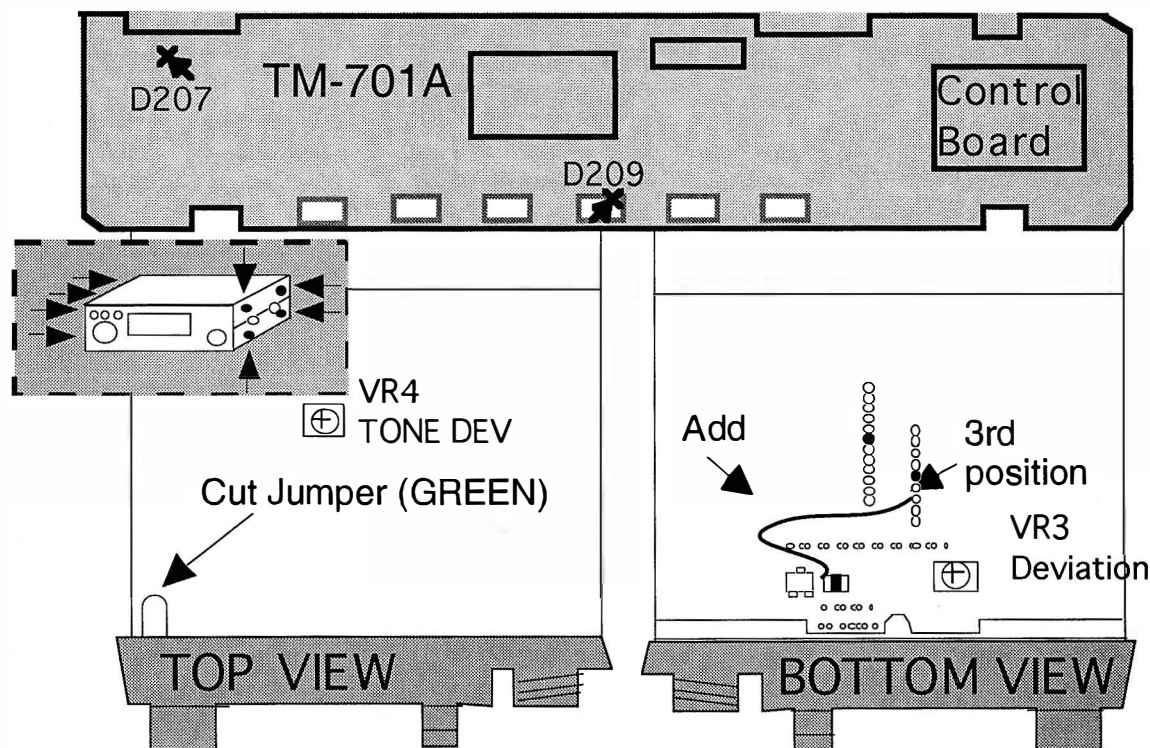
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KENWOOD TM-701A

EXPANDED RF / CROSS BAND REPEATER

1. Disconnect the power and antenna.
2. Remove the top and bottom cover.
3. Remove knobs from front panel and the nuts from the mic and channel switch.
4. Remove 4 screws holding the front panel and the 3 screws on the control board.
5. Locate the green jumper wire sticking out the front panel, behind the VFO button.
6. **Cut the green jumper** and tape the edges to prevent them from shorting.
7. Optional: Install diodes D207 & D209 on control board X57-3350-00.
8. Solder a jumper to the foil side of the TX-RX board as shown in drawing.
9. Reassemble the radio.
10. **Reset the microprocessor** (Press and hold [MR] while turning on the power).



CROSS BAND OPERATING PROCEDURES

Turn on the Repeater mode : Press and hold [F] and then press [DUP]. Then Press [F] longer than 1 Second. The F indicator will blink. Press [LOW]. Three dots should appear in the display when the mode is on.

Turn off : Press [VFO].



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Performance Report

Radio _____

Date _____

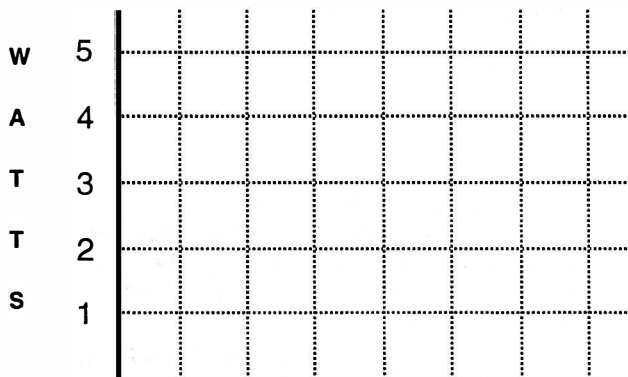
Owner : Name _____

Address _____

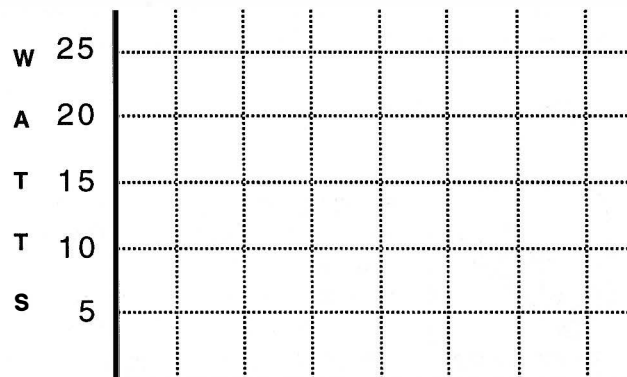
City _____ St. _____ Zip _____

Phone () - _____

Description	Before	After
Power out (Low)	_____ Watts	_____ Watts
Power out (High)	_____ Watts	_____ Watts
Frequency Error (Simplex)	_____ Hz	_____ Hz
Frequency Error (Offset)	_____ Hz	_____ Hz
Receive Sensitivity (Mid-band)	_____ uv	_____ uv
Receive Sensitivity (____MHz)	_____ uv	_____ uv
Receive Sensitivity (____MHz)	_____ uv	_____ uv
PL Deviation	_____ Hz	_____ Hz
DTMF Deviation	_____ KHz	_____ KHz
Audio Deviation	_____ KHz	_____ KHz
Lowest usable Freq @ .5 Pwr	_____ MHz	_____ MHz
Highest usable Freq @ .5 Pwr	_____ MHz	_____ MHz



Frequency

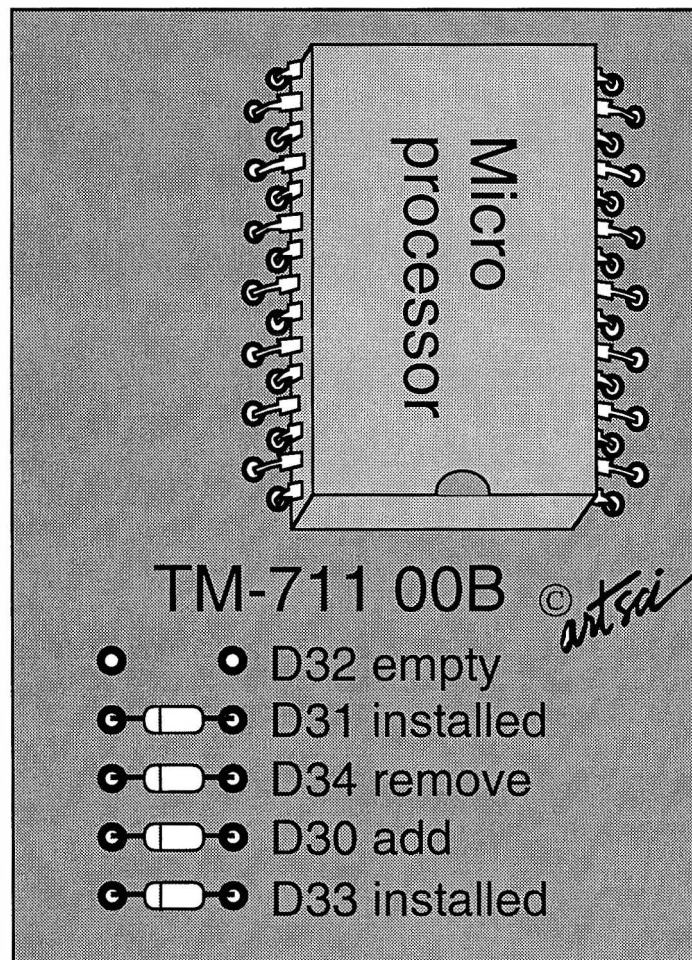


Frequency

KENWOOD TM-711

EXPANDED RF - MARS/CAP
142.000 MHz - 151.995 MHz

1. Disconnect the power and antenna.
2. Remove the top cover.
3. Locate the microprocessor.
4. Locate and cut diode D30.
5. Solder install a 1N914 in position D34
6. Reassemble the radio.



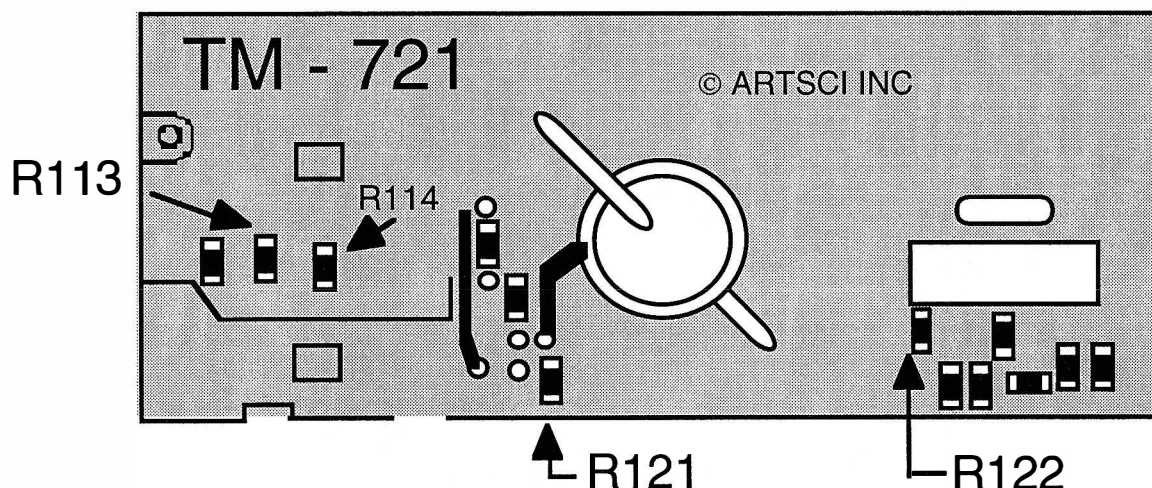
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KENWOOD TM-721

EXPANDED RF/ CROSS BAND REPEATER

- 1 Remove power, antenna and the top and bottom covers.
2. Remove the six silver screws holding the front panel to the chassis.
3. Locate R113 and R114
4. **Solder a jumper** between the open pads between R113 & R114
5. **Remove R121.** (This is the cross band repeater mod.)
6. **Remove R122.** (This will override the automatic 3 minute time out timer)
7. **Cut R57** from the back of the board. Do not cut R58
8. Reassemble the radio
9. **Reset the microprocessor twice.** Press and hold the MR key and turn the power switch. Do this twice.



CROSS BAND OPERATING PROCEDURES

The TM-721 will receive a signal on one band and will automatically re-transmit it on the other band. Each band can contain shift information. Only one band may contain PL encode/decode information. Do not turn tone and CTCSS on in one band.

Turn on / off the Repeater mode : Press F and then press A.B.C. Key. Three dots should appear in the display when the mode is on.

MORE ---

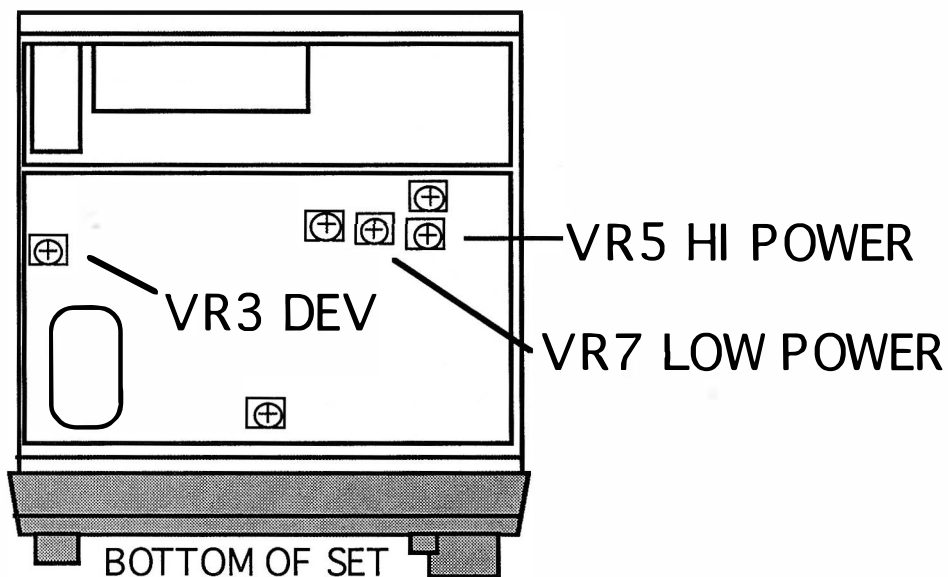
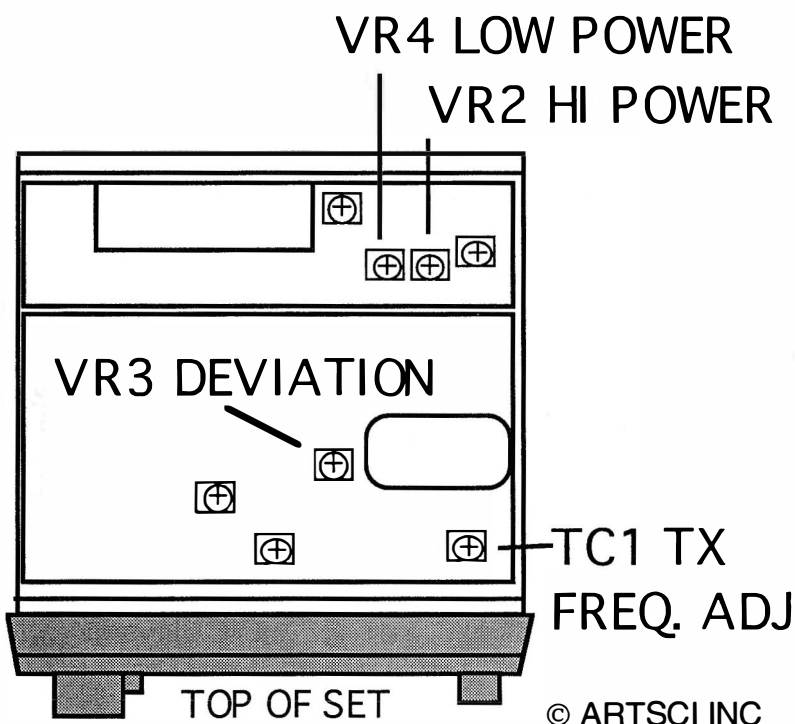
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KENWOOD TM-721

ALIGNMENT CONTROLS



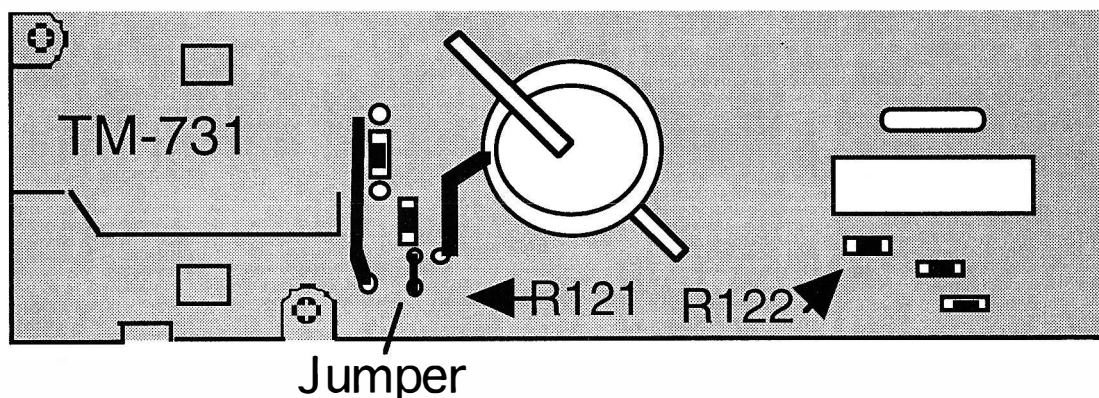
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KENWOOD TM-731

EXPANDED RF/ CROSS BAND REPEATER/ TIME OUT TIMER

- 1 Remove power and antenna and the top and bottom covers.
2. **CUT RESISTOR R25.** R25 is located on the Control unit on the bottom side of the Radio. The resistor can be seen by looking through the cutout of the chassis just behind the front panel.
3. Remove silver color screws from the front chassis. The screws are located 2 on each side, 1 on the top and 1 on the bottom.
4. Pull the front panel away from the radio. Do not unplug any cables.
5. **Install a jumper** wire as shown in diagram 1.
6. **Remove R121.** (This is the Cross band repeater mod.)
7. **Remove R122.** (This will override the automatic 3 minute time out timer)
8. Reassemble the radio.
9. **Reset the microprocessor twice.** Press and hold the [MR] key and turn radio on.



CROSS BAND OPERATING PROCEDURES: The TM-731 will receive a signal on one band and will automatically re-transmit it on the other band. Each band can contain shift information. Only one band may contain PL encode/decode information. Do not turn Tone and CTCSS on in one band.

Turn on / off the Repeater mode : Press [F] and then press [A.B.C.] Key. Three dots should appear in the display when the mode is on.

MORE ---

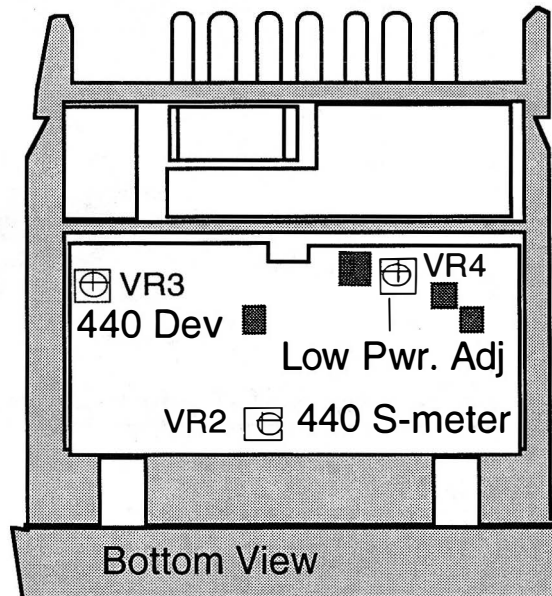
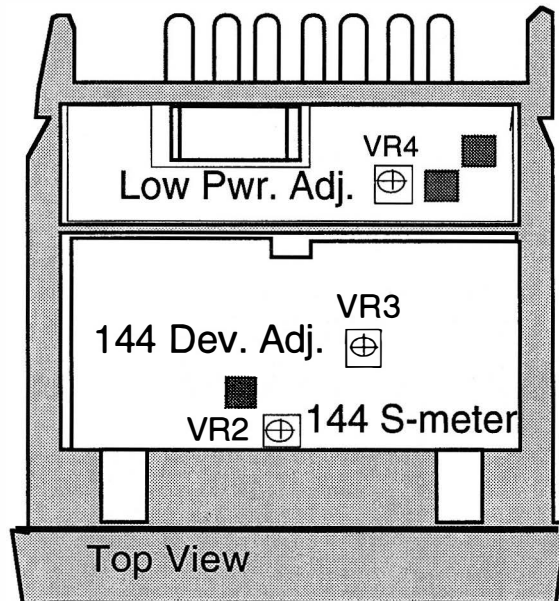
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KENWOOD TM-731

ALIGNMENT POINTS



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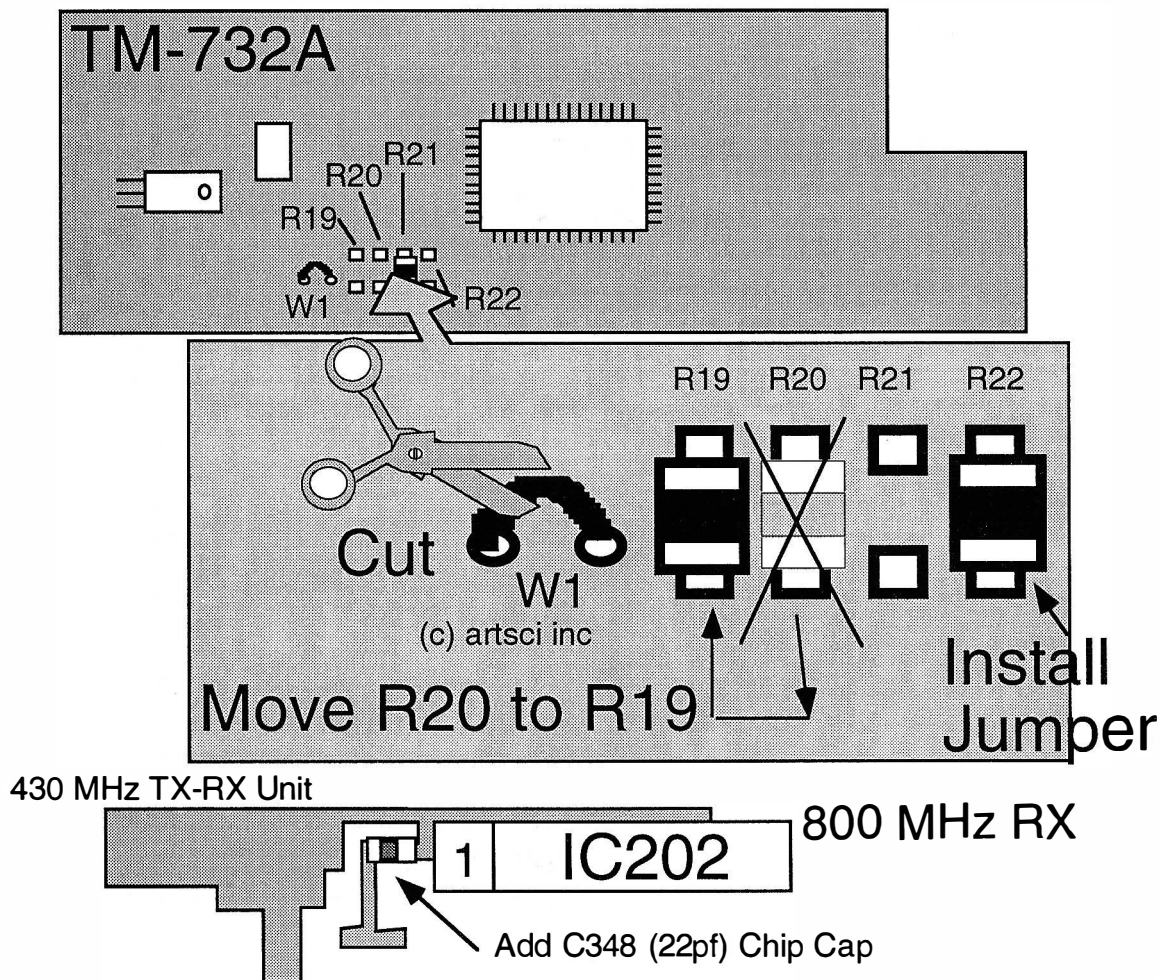
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KENWOOD TM-732A

EXPANDED RF

1. Remove power, antenna and the top and bottom covers.
2. Remove front display and expose circuit board.
3. **Clip Jumper W1.** (Expanded RX and 800 MHz) This may cause some problems in later models of the radio. **YOU MAY NOT NEED THIS STEP.**
4. **Remove Resistor R20 & R21** if present.
5. **Place a jumper in position R19 & R22.** (R22 not required in some models)
6. **Add a 22pf chip cap** in position C348 on the 440 TX-RX board. (800 MHz RX mod)
7. Reassemble the radio.
8. **Reset the microprocessor.** (Press [MR] & [VFO] & turn the radio on)

800 MHz Enable/Disable: Press [MHz] in 440 VFO for longer than 1 second.



MORE --

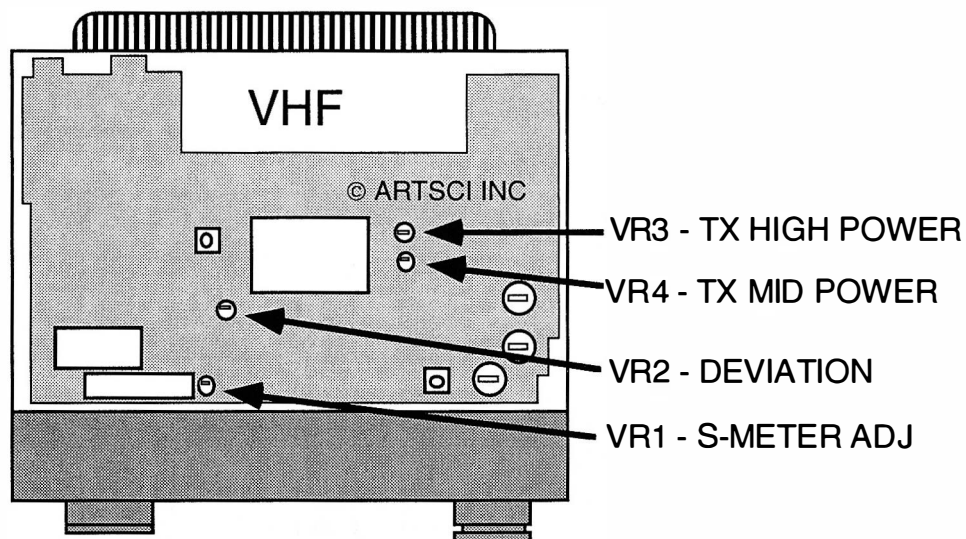
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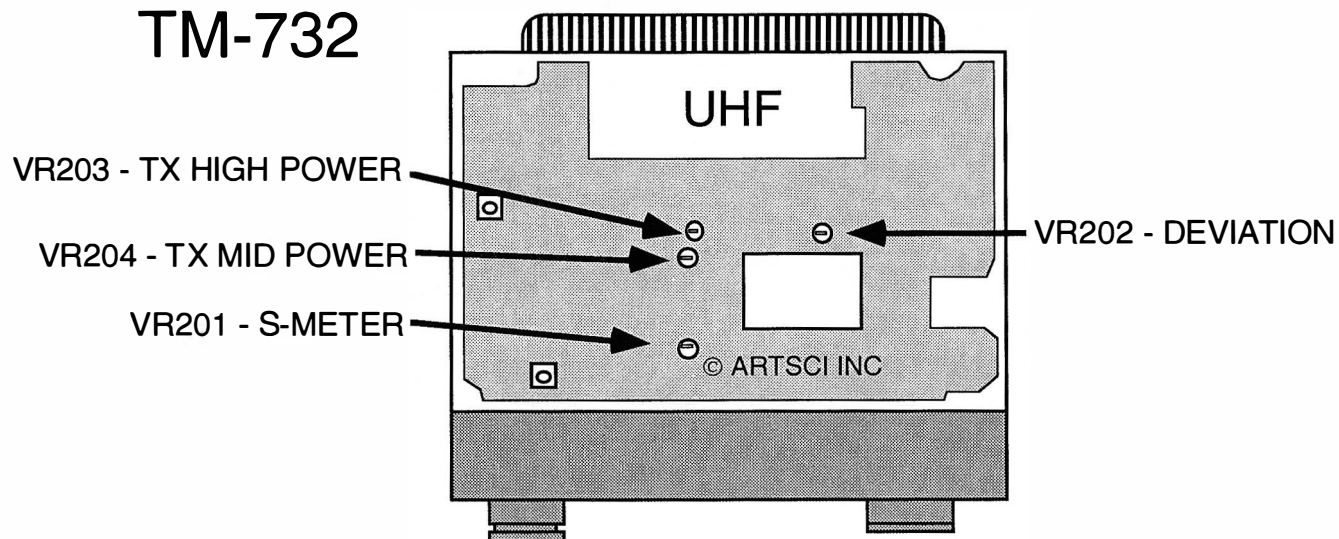


KENWOOD TM-732A

ALIGNMENT CONTROLS



TM-732



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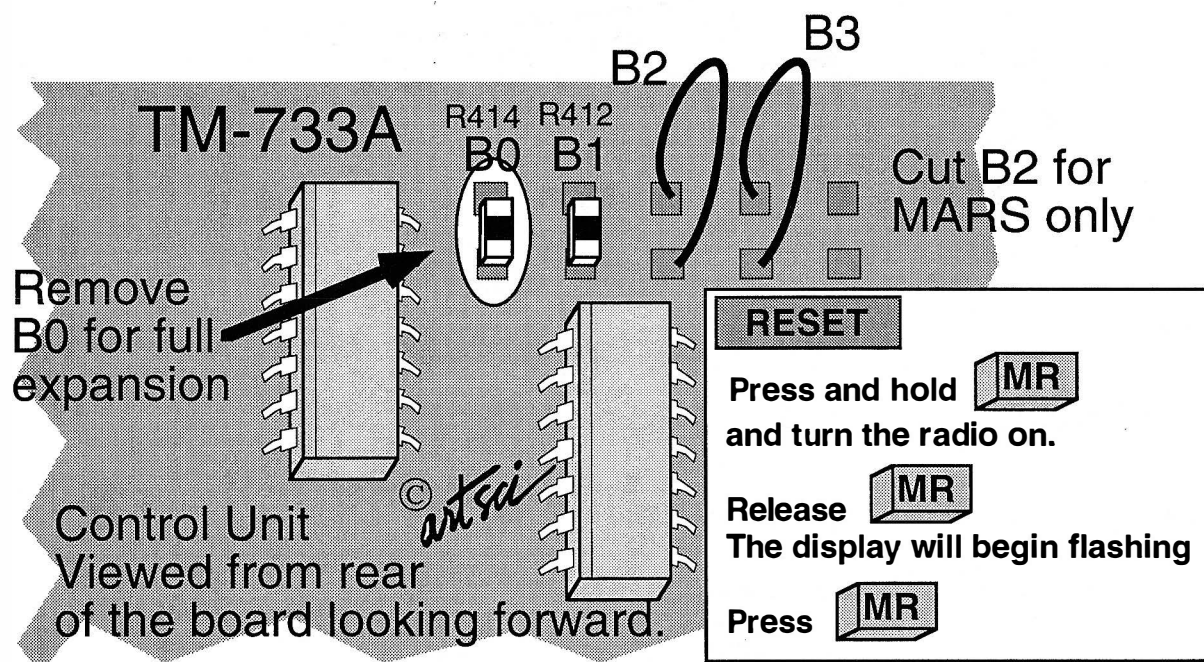
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KENWOOD TM-733A

EXPANDED RF

RX 118 - 173.995 MHz, 300.000 - 469.975 MHz
TX 136.000 - 173.995 MHz, 410.000 - 469.975 MHz

1. Remove power, antenna and the top covers.
2. Unplug the speaker and set it aside
3. Locate and remove chip "B0". (see drawing)
4. Plug the speaker back in.
5. Reassemble the radio.
6. Reset the microprocessor (Press and hold the [MR] and turn power on)



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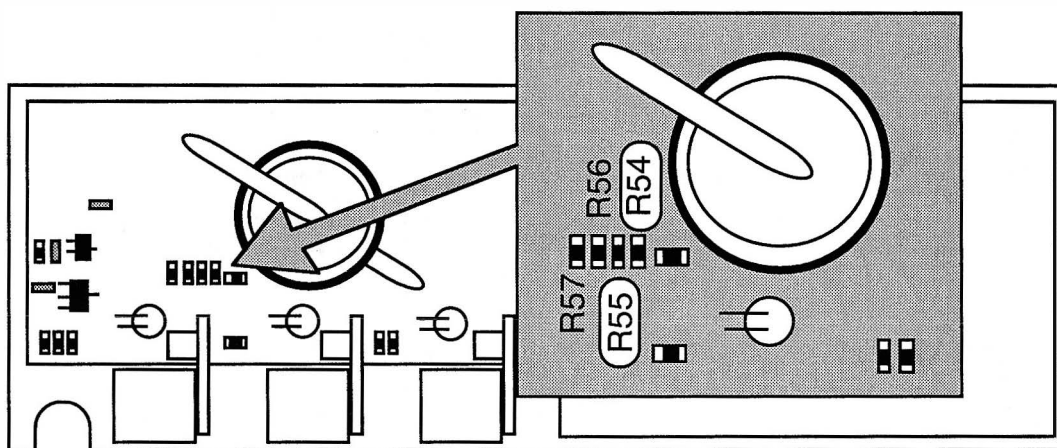
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KENWOOD TM-741, TM-641

EXPANDED RF

1. Remove power and antenna
2. Detach the front control head assembly.
3. Locate and **cut the GREEN wire** on the control board. The control board is on the body of the radio. The GREEN wire is located towards the left edge of the board. Tape the edges of the green wire to prevent shorting.
4. Remove the back cover from the control head.
5. Locate and **remove chip resistors R54 and R55**. Caution should be taken while removing these resistors.
6. Reassemble the control head.
7. Reassemble the transceiver.



New Frequency range:

18-54 MHz
 50-90 MHz
 118-174 MHz
 215-260 MHz
 410-470 MHz
 1100-1400 MHz

MORE ---



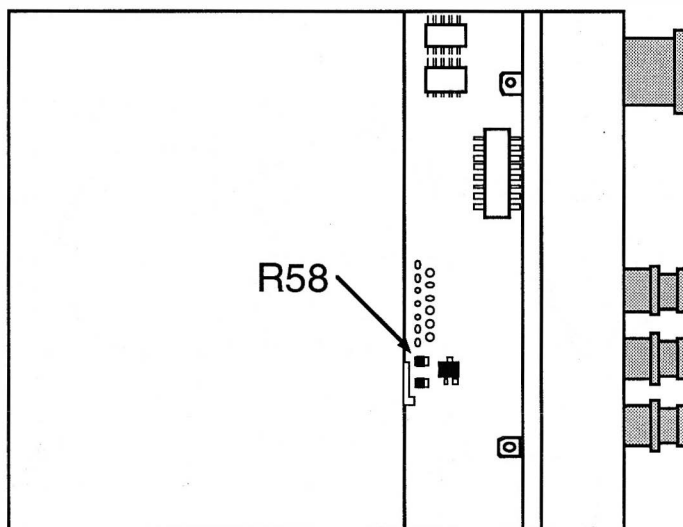
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KENWOOD TM-741 & TM-941

CROSS BAND REPEATER

- 1 Remove power and antenna and the top and bottom covers.
2. Detach the front panel assembly.
3. Locate and **cut the GREEN wire** on the control board. The control board is on the body of the radio. The GREEN wire is located towards the left edge of the board.
4. Locate and **cut resistor R58**. R58 is blue colored and located on the control board (Cross band repeater mod)
- 5: Reassemble the transceiver.



CROSS BAND OPERATING PROCEDURES: The TM-X41 will receive a signal on one band and will automatically re-transmit it on the other band. Each band can contain shift information. Only one band may contain PL encode/decode information. Only one band may contain Tone and CTCSS.

- 1 Select one of the band using the BAND SELECT key.
(The PTT indicator will light.)
2. Select the other band by pressing the CONTROL SELECT key.
(Skip this step for one way repeat only)
(The green light on the key will light.)

Turn on / off the Repeater mode :

Press the [F] key and then press the [MUTE] key.

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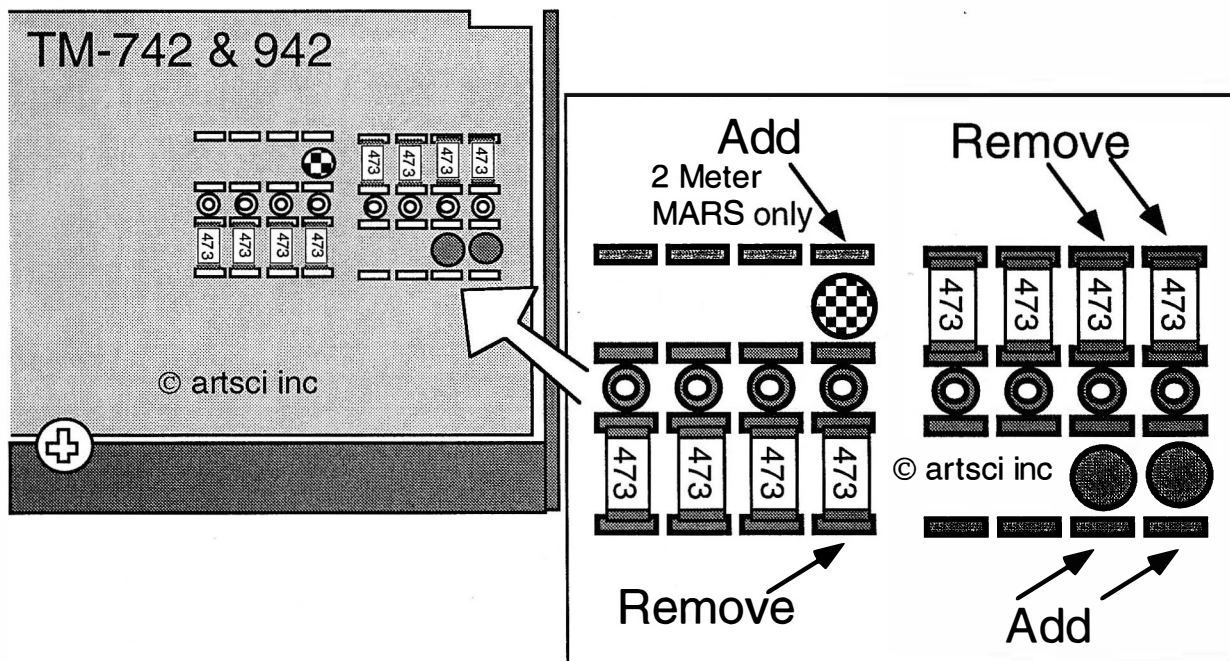


KENWOOD TM-742 & TM-942 EXPANDED RF

(28 MHz - 18-54 RX/26-45 TX)
 (50 MHz - 40-90 RX/46-76 TX)
 (144 MHz - 136-184 RX/TX)
 (220 MHz - 215-260 RX 215-235 TX)
 (440 MHz - 410-470 RX/TX)
 (1.2 GHz - 1100 - 1400 RX/TX)

- 1 Remove power and antenna.
2. Remove the front panel from the main body.
3. Remove the 4 screw on the bottom cover.
4. Loosen the 4 screws on the side of the radio.
5. Locate the control unit (the large board near the front panel area).
6. **Remove chip resistors** as indicated below (You will be using them in the next step).
7. Place two chip resistors in the locations shown (Checkboard pattern)
8. Reassemble the radio.
9. **Reset the microprocessor** (Press and hold the [MR] key and turn power on)

For 800 RX :press and hold [MHz] for 1 second. An 800 MHz antenna should be connected to the copper pad of IC9 Pin 1 on UHF board.



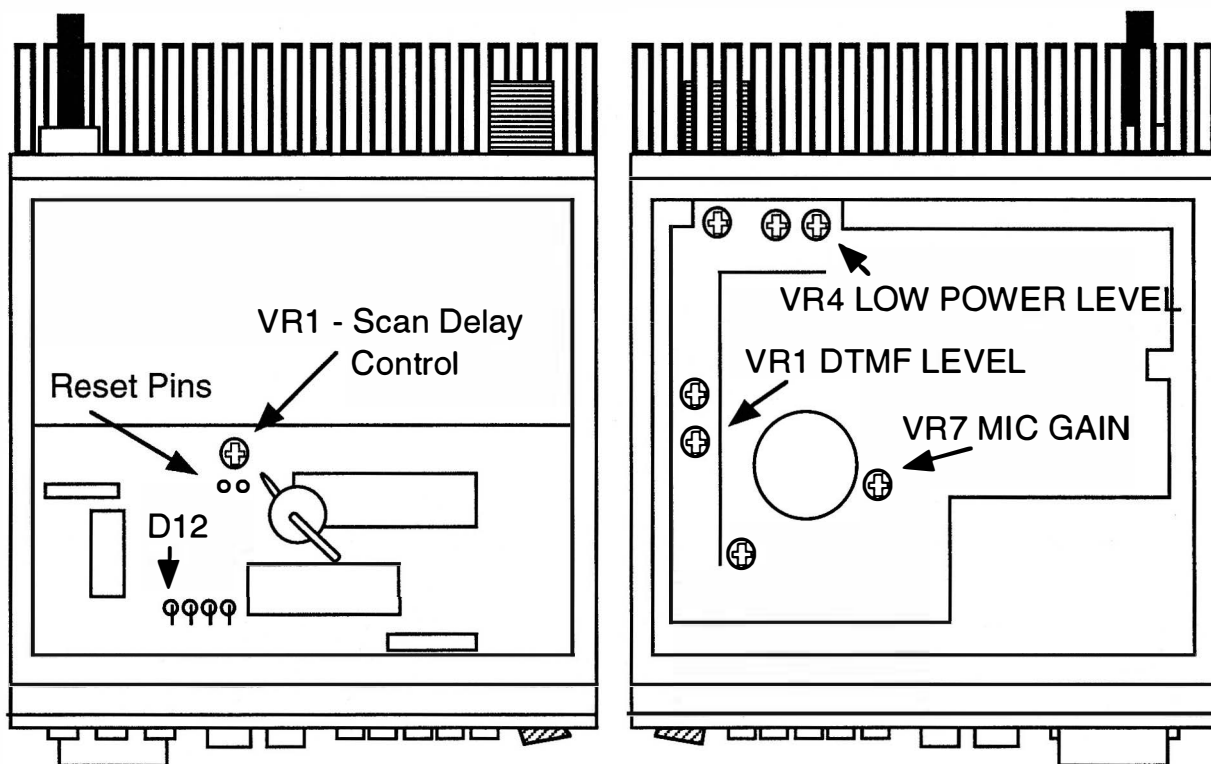
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KENWOOD TM-2530, TM-2550, TM-2570

EXPANDED RF

1. Disconnect the power and antenna.
2. Remove the bottom case .
3. Locate the Control Unit on the bottom of the radio. This is the same board the TU-7 & MU-1 are mounted on.
4. **CUT diodes D8 & D11 & D12.** They are located to the left of IC 3.
5. Reassemble the radio.
6. **RESET the CPU.** (Press and hold the [PS] Key while turning on the radio.)



Frequency increases to 150.995 MHz

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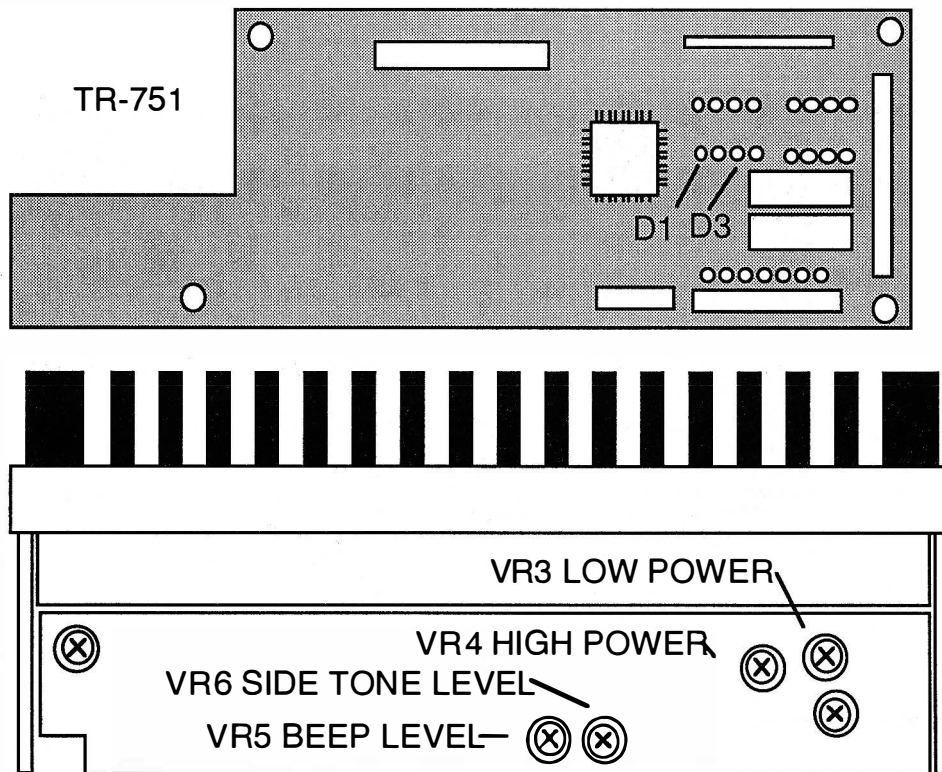
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KENWOOD TR-751

EXPANDED RF M/C

1. Disconnect the power and antenna.
2. Remove the case .
3. Locate the Control Unit on the radio.
4. **CUT diodes D1 & D3.** They are located to the left of IC 3.
5. Reassemble the radio.
6. **RESET the CPU.** (Hold [M] key and turn on power)



DEVIATION - VR7 ON RX UNIT (OTHER SIDE)



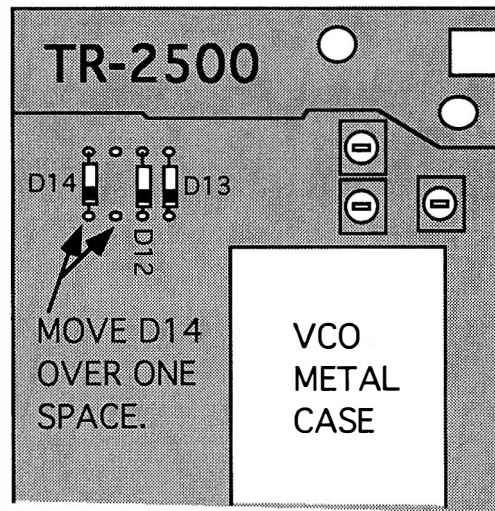
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KENWOOD TR-2500

EXPANDED RF M/C

1. Disconnect the battery and antenna.
2. Remove the 3 screws holding on the back cover.
3. Remove the 2 screws on the bottom of the radio.
4. Unsolder the tabs of the lithium battery.
5. **Unsolder Diode D14.**
6. **Install the diode in the location next to D12.**
7. Reinstall the lithium battery.
8. Reassemble the radio.



Range : 141.000 MHz to 151.000 MHz

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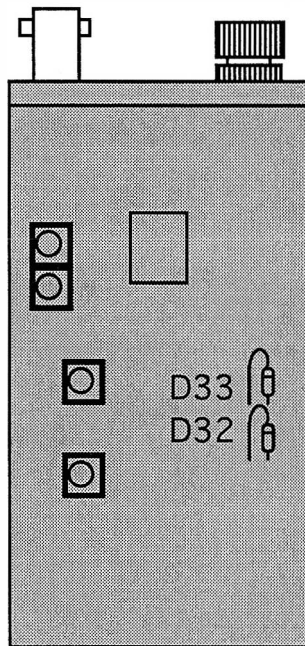
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KENWOOD TR-2600

EXPANDED RF M/C

1. Disconnect the power and antenna.
2. Remove the screws and open the radio.
3. **Remove diodes D32 & D33.** They are located on the RX unit (x%%-1380-XX)
4. **Press the RESET Switch**
5. Reassemble the radio.



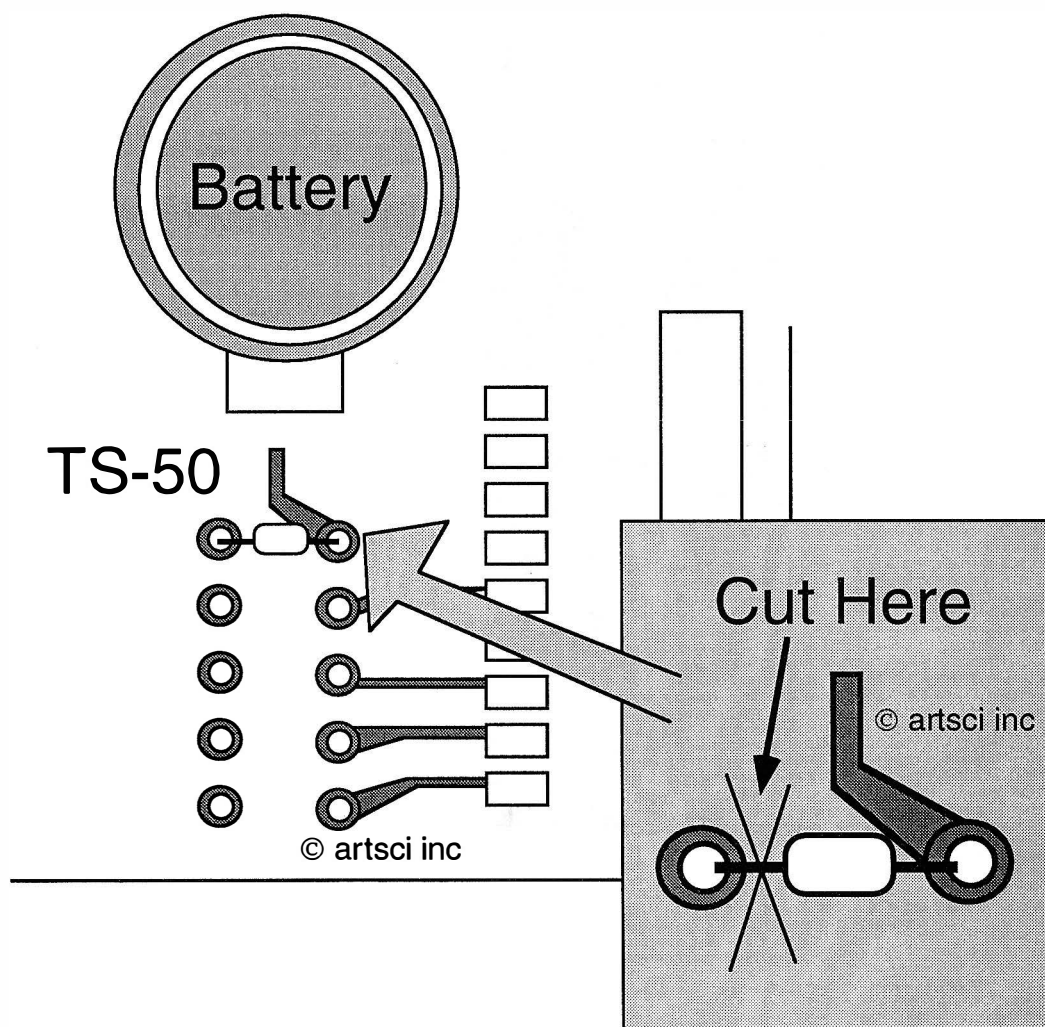
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KENWOOD TS-50

EXPANDED RF M/C

1. Disconnect the power and antenna.
2. Remove the 5 screws holding on the bottom cover.
3. Loosen the 4 screws on the side of the radio & remove the bottom cover.
4. Place the radio upside down with the top towards you.
5. Locate and **remove Diode D5** on Digital unit. See diagram.
6. Reassemble the radio
7. **Reset the microprocessor** (Press and hold [A=B] and turn power on)



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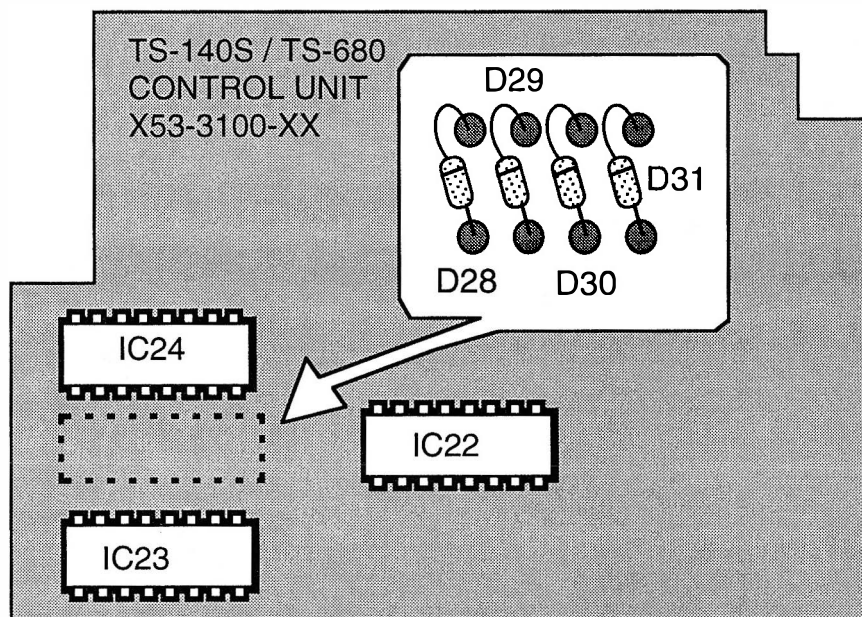
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KENWOOD TS-140S

EXPANDED RF M/C

1. Disconnect the power and antenna.
2. Remove the top and bottom covers from the radio.
3. Locate the Control board on the bottom of the TS-140S
4. **Remove diode D31** on the Control board.
5. Reassemble the radio.
6. **RESET the CPU.**



Auxiliary Function:

1. Put radio in VFO mode and turn power off.
2. Press and hold [VFO/M] & [LSB/USB] and turn power on.

The display will say " -HELLO-"
The CW announcement will please you.



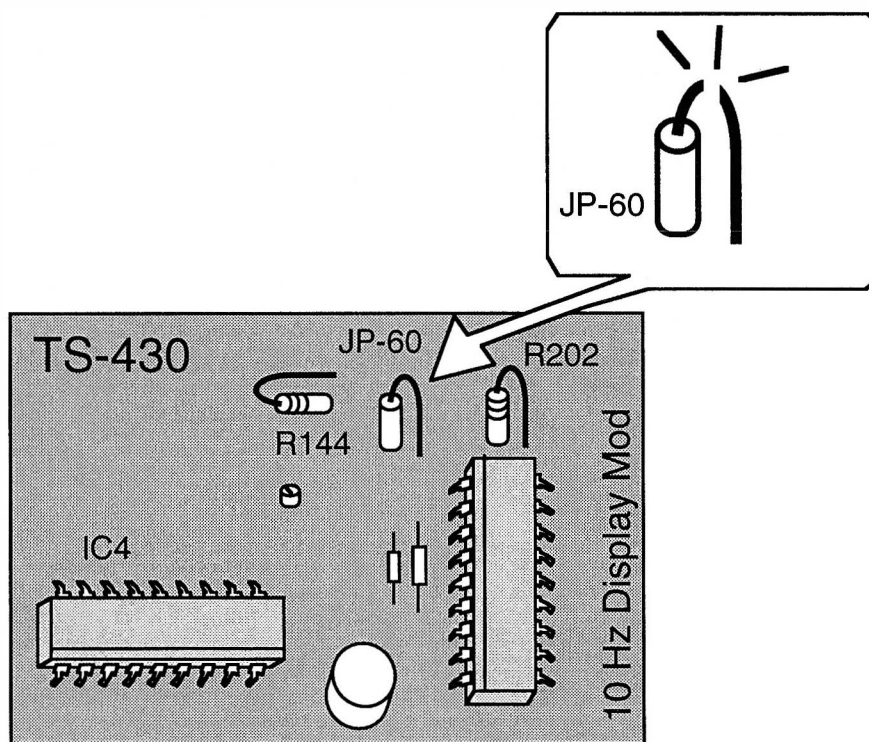
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KENWOOD TS-430S

EXPANDED RF M/C

1. Disconnect the power and antenna.
2. Remove the top and bottom covers from the radio.
3. Locate connector # 10 on the RF circuit board
4. **Cut the two wires that are NOT GREEN.** Leave the Green Wire.
5. Wrap Tape around the ends of the cut wires.
6. Locate CONTROL unit and **cut JP-60** for 10 Hz display. See below
7. Reassemble the radio.
8. **RESET the CPU.**



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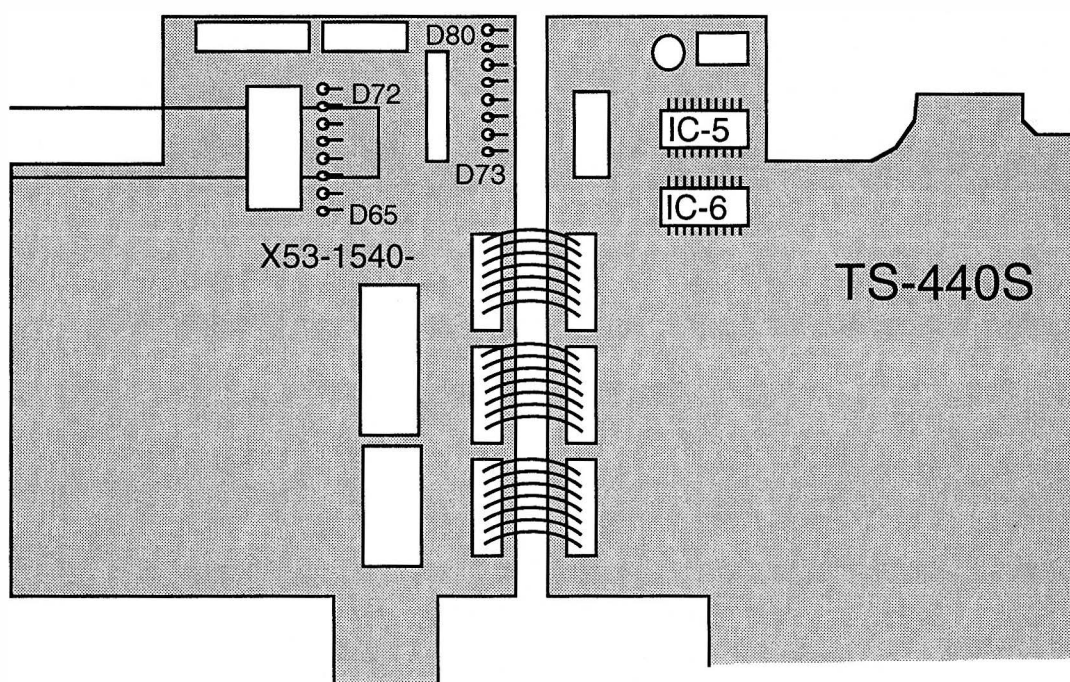
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KENWOOD TS-440S

EXPANDED RF M/C

1. Disconnect the Power and antenna.
2. Remove the top and bottom covers from the radio.
3. Remove the Countersunk screws that secure the front panel to the chassis. There are two on each side
4. Gently pull the front panel forwards.
5. Remove the 5 small round head screws that secure the shield plate to the front panel. There are 2 on top and 3 on the bottom.
6. **Remove Diode D80.** D80 is located in the corner near Connector 54.
7. **Cut Diode 66 for 10 Hz resolution.** See page 24 of the instruction manual.
8. Reassemble the radio.
9. **RESET the CPU.**



RESET CPU: Press and hold [A=B] and turn power on.



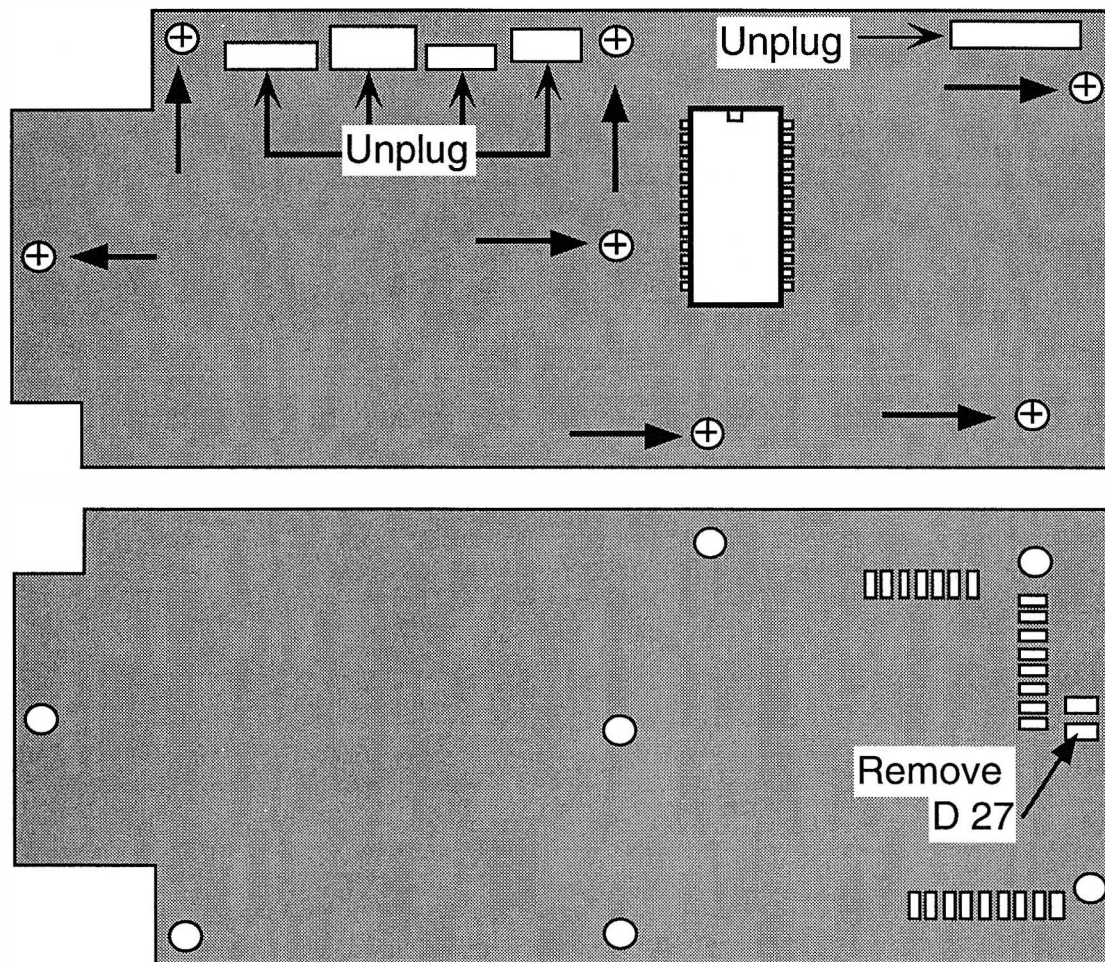
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KENWOOD TS-450S

EXPANDED RF M/C

- 1 Disconnect the Power and antenna.
- 2 Remove the top and bottom covers from the radio. (14 Screws)
- 3 Remove the top screws (countersunk) from each side of the front panel.
- 4 Loosen the bottom screws (countersunk) from each side of the front panel.
- 5 Carefully pull the top front of the front panel forward to expose the Digital board.
- 6 Remove the seven screws from the digital board.
- 7 Disconnect the 5 cables from the digital board.
- 8 Rotate the board towards the front panel to gain access to the back side of the board.
- 9 Locate and **remove diode D27**. Do not pry up the diode. The traces will rip apart.
- 10 Reassemble the radio.



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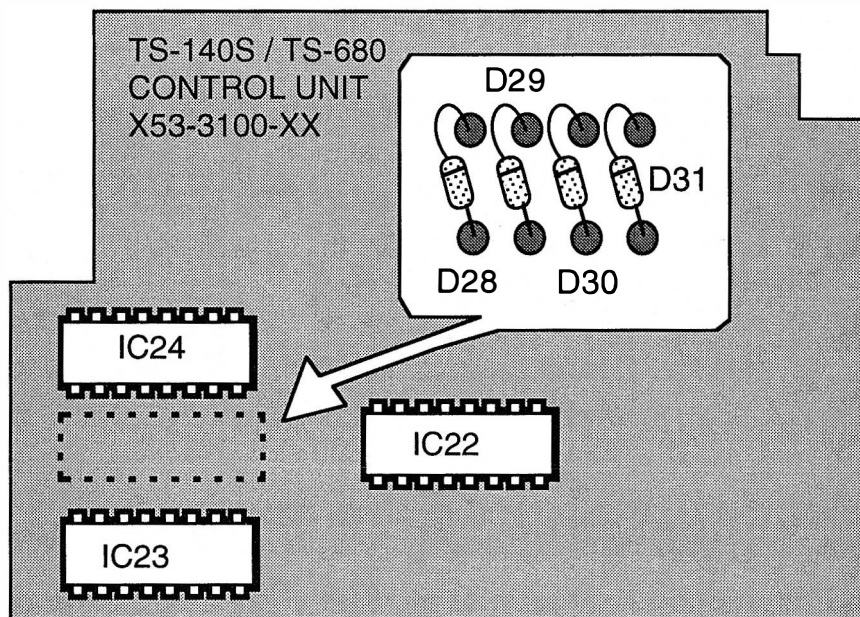
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KENWOOD TS-680

EXPANDED RF M/C

1. Disconnect the power and antenna.
2. Remove the top and bottom covers from the radio.
3. Locate the Control board on the bottom of the TS-680S
4. **Remove diode D31** on the Control board.
5. Reassemble the radio.
6. **RESET the CPU.**



Auxiliary Function:

1. Put radio in VFO mode and turn power off.
2. Press and hold [VFO/M] & [LSB/USB] and turn power on.

The display will say "-HELLO-"
The CW announcement will please you.



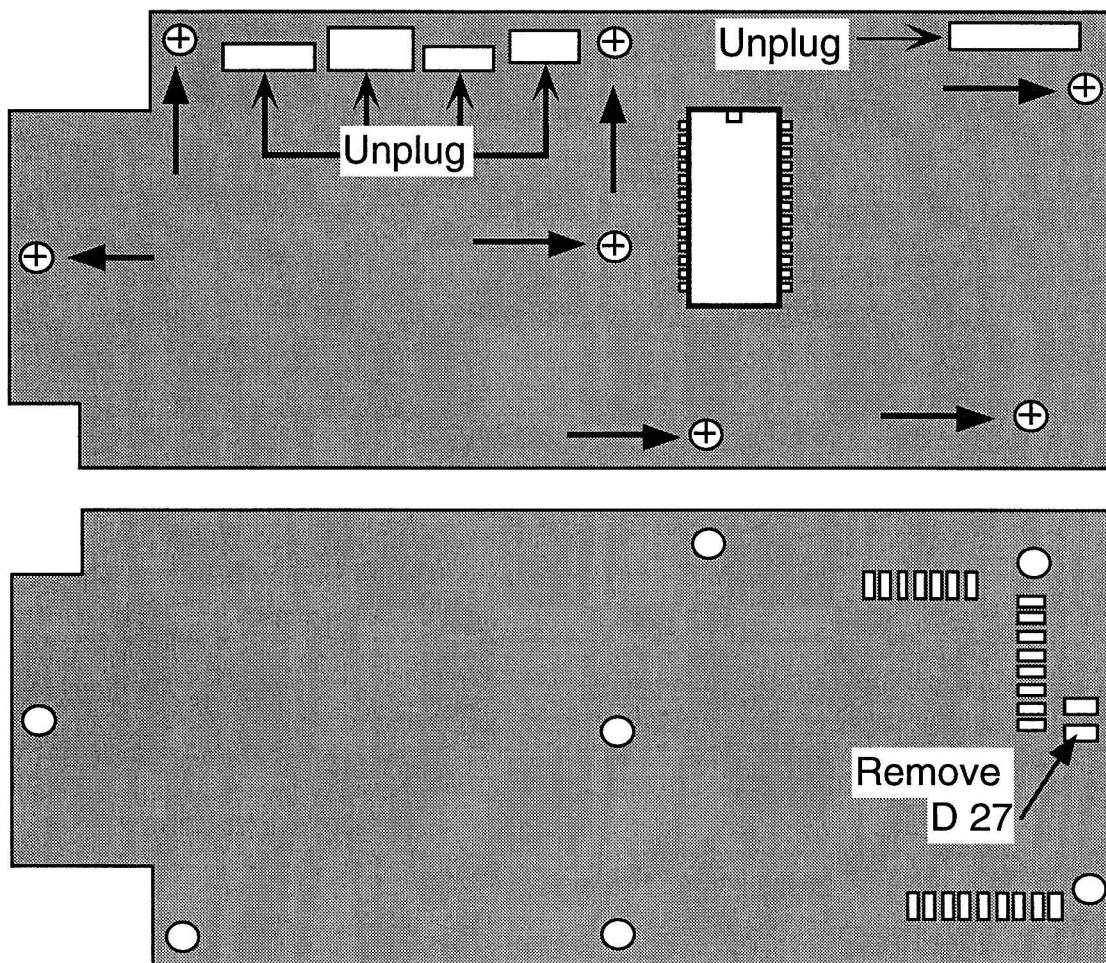
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KENWOOD TS-690S

EXPANDED RF M/C

1. Disconnect the Power and antenna.
2. Remove the top and bottom covers from the radio. (14 Screws)
3. Remove the top screws (countersunk) from each side of the front panel.
4. Loosen the bottom screws (countersunk) from each side of the front panel.
5. Carefully pull the top front of the front panel forward to expose the Digital board.
6. Remove the seven screws from the digital board.
7. Disconnect the 5 cables from the digital board.
8. Rotate the board towards the front panel to gain access to the back side of the board.
9. Locate and **remove diode D27**. Do not pry up the diode. The traces will rip apart.
10. Reassemble the radio.



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KENWOOD TS-711

EXPANDED RF

- 1 Disconnect the power and antenna.
2. Remove the covers.
4. **REMOVE D30**
5. Reassemble the radio.
6. **RESET the CPU.**



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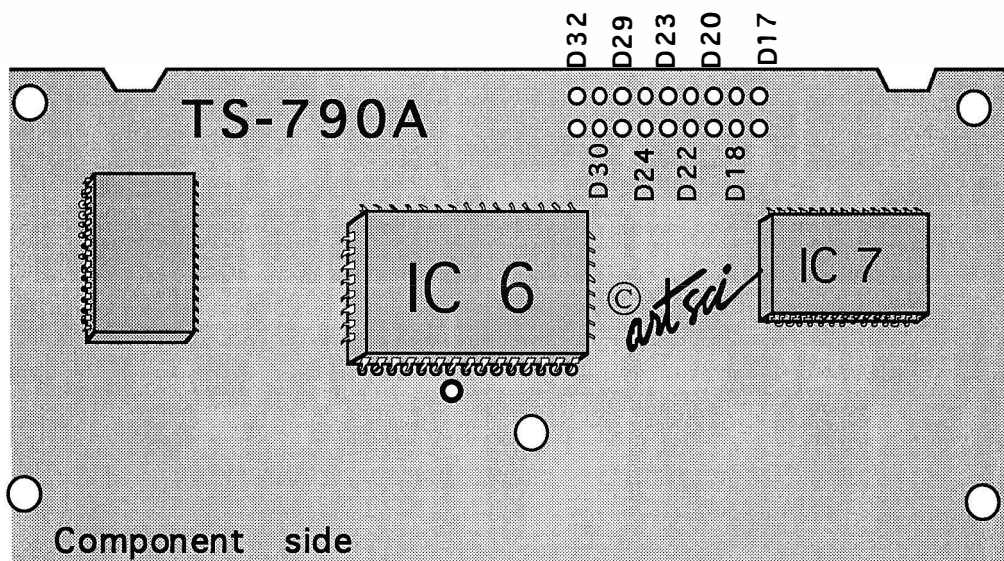
KENWOOD TS-790A

EXPANDED RF & X-BAND REPEATER

TX: 142-152 MHz

RX: 140-168 MHz, 340-373 MHz, 425-458 MHz, 840-905 MHz,
(1230-1305 MHz with optional UT-10)

1. Disconnect the power and antenna.
2. Remove the top and bottom cover (14 screws).
3. Locate circuit board positioned vertically behind the front panel.
4. Locate and **remove diodes D29 & D30**.
5. Locate and **remove diode D32**. (X-Band mod)
5. Reassemble radio
6. **Reset the microprocessor**. (Press and hold [A=B] and turn power on)



Note: Factory diode set-up: IN-D22,29,30,32
IN but clipped by factory-D23,24
Empty position=D17, 18, 20

RANGE: 130-170 MHz & 422.2-463 MHz

X-Band ON/OFF - [F] and then [M.IN] (A Star will appear on the display when on)
Reports state X-BAND works in all modes.

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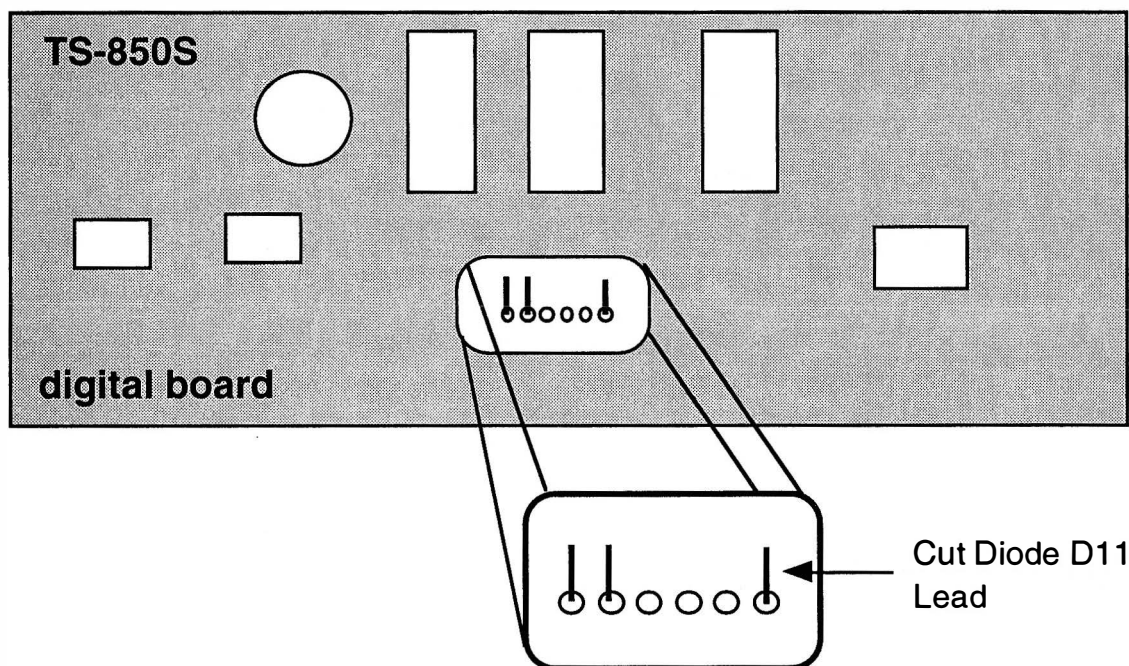
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KENWOOD TS-850S

EXPANDED RF M/C

1. Disconnect the power and antenna.
2. Remove the 16 screws top and bottom covers from the radio. Be careful not to break the speaker wires.
3. Remove the top and bottom screws from each side of the front panel assembly.
4. Pull the front panel forward to expose the Digital board.
5. Locate and **cut the lead from diode D11.**
6. Reassemble the radio.
7. **Reset the microprocessor** (Holding the [A=B] Key while turning the power on.)



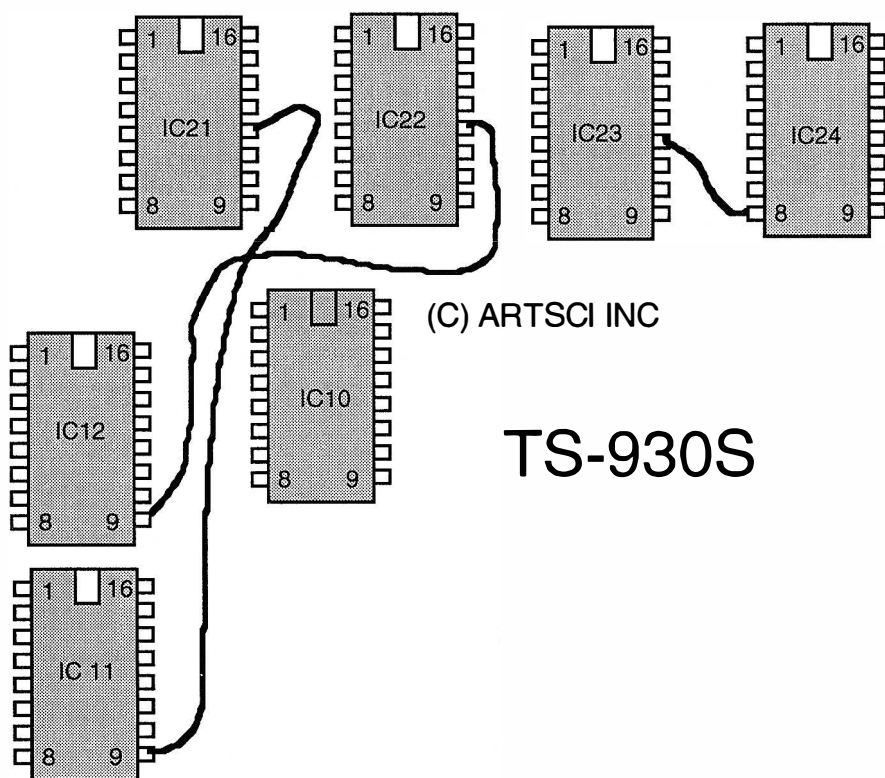
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KENWOOD TS-930S

EXPANDED RF M/C

1. Disconnect the power and antenna.
2. Remove the top and bottom covers from the radio.
3. Remove the four screws from the speaker mounting and the top panel Assembly.
4. Swing the assembly away and unplug the Red/Black battery leads from the Digital unit X54-1680-00.
5. **Solder wires between the following locations:**
 - IC 21 Pin 12 to IC 11 Pin 9
 - IC 22 Pin 12 to IC 12 Pin 9
 - IC 23 Pin 12 to IC 24 Pin 8
- Tack-solder on the component side of the board is OK
5. Reassemble the radio.



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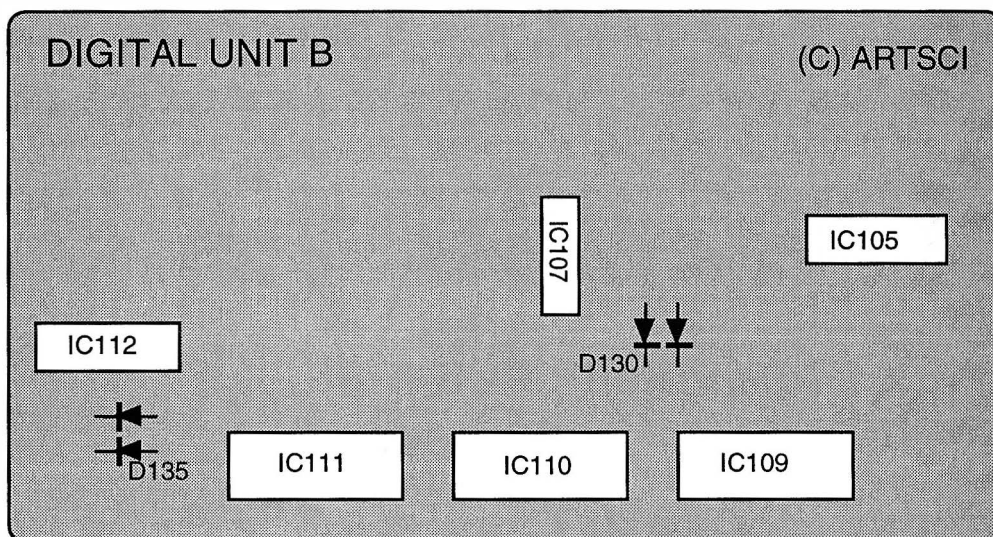


KENWOOD TS-940

EXPANDED RF

1. Disconnect the power and antenna.
2. Remove case screws and case.
3. Locate Digital Unit B. This is the board that is in the enclosure where the VS-1 is mounted. Digital Unit B is the board closest to the Front Panel.
4. **Cut Diodes D130 & D135.** Located near IC-109.
5. Reassemble the radio
6. Reset the microprocessor
(Turn the radio on, Press and Hold the [A=B] Switch and turn off and back on the radio.)

TS-940



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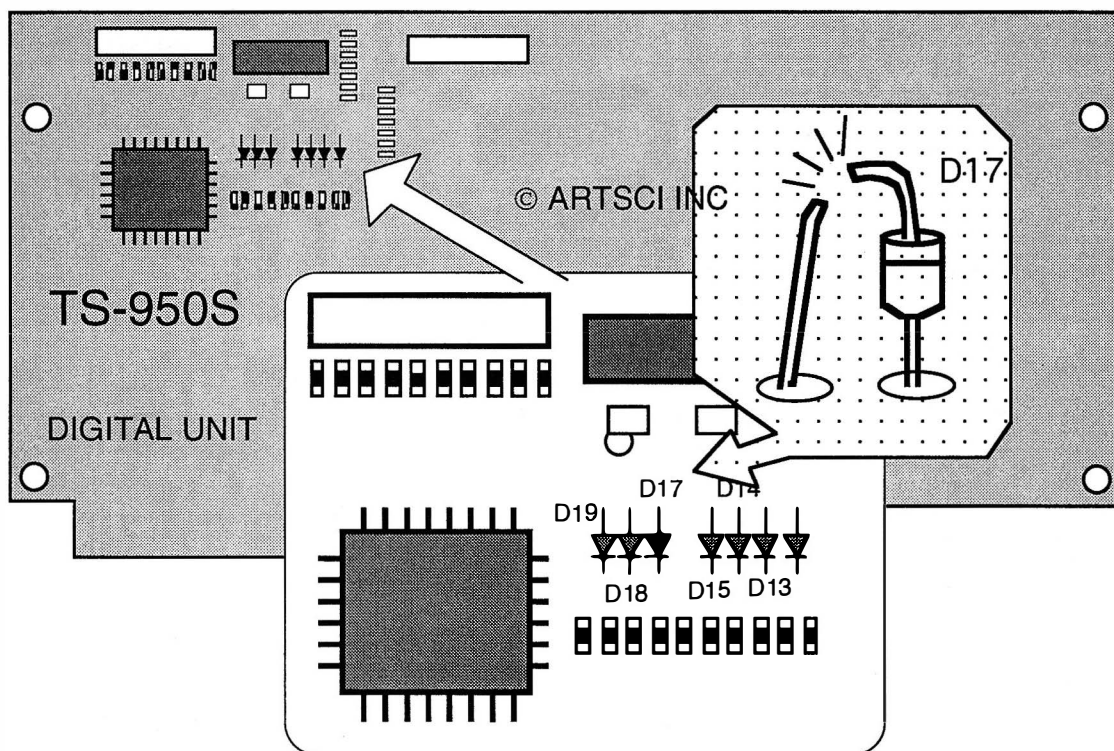
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KENWOOD TS-950SD

EXTENDED RF

1. Remove power and antenna.
2. Remove the top and bottom covers
3. Locate the Digital Unit.
4. **Cut diode D-17**
5. Reassemble the Radio
6. **Reset the Microprocessor.**

RESET: Press and hold [A=B] and turn power on.



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KENWOOD TS-2400

EXTENDED RF

1. Remove Power and Antenna.
2. Open the radio.
3. Locate the RX Circuit board.
4. Locate and **cut Diodes D32 and D33.** (Located near the DTMF IC)
5. Reassemble the radio.
6. **Reset the Microprocessor.**



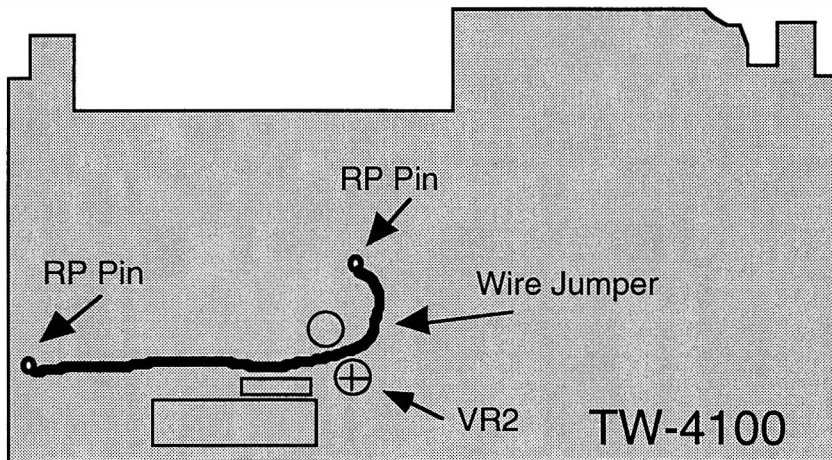
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KENWOOD TW-4100

REPEATER MOD

1. Remove power and antenna.
2. Remove 4 screws securing the top cover.
3. Remove 10 screws securing the bottom cover.
4. **Solder a wire jumper connecting the two RP Pins.** (see drawing)
5. Reassemble the radio.



CROSS BAND REPEATER PROCEDURES

The VFO and a Memory channel (except 8 & 9) must be used. Select the proper frequencies, offsets & tone. (VFO simplex operation must use DUP with a 0 offset.)

TURN ON - Enter frequencies in a memory and VFO and press [Shift].

Turn power off. Press and hold [REV] and turn radio on.

TURN OFF - Turn Power off.

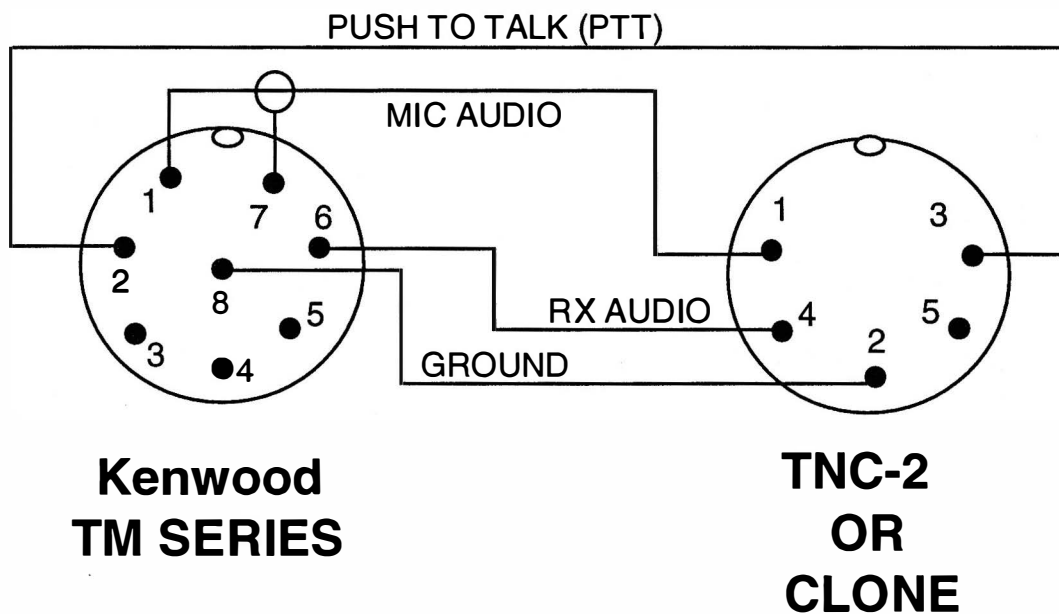
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KENWOOD TM SERIES

TNC-2 HOOKUP



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Performance Report

Radio _____

Date _____

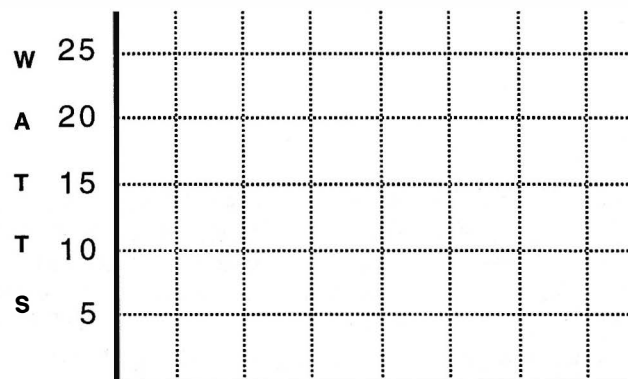
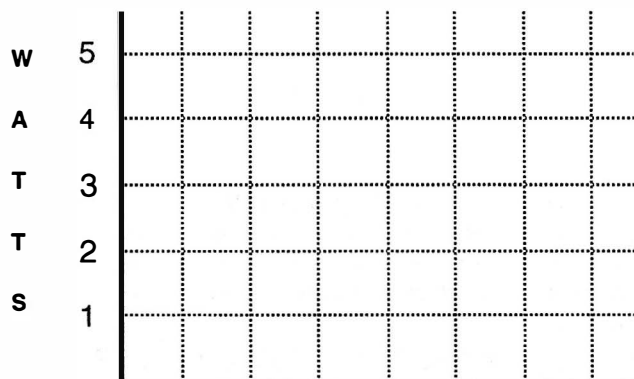
Owner : Name _____

Address _____

City _____ St. _____ Zip _____

Phone () - _____

Description	Before	After
Power out (Low)	_____ Watts	_____ Watts
Power out (High)	_____ Watts	_____ Watts
Frequency Error (Simplex)	_____ Hz	_____ Hz
Frequency Error (Offset)	_____ Hz	_____ Hz
Receive Sensitivity (Mid-band)	_____ uv	_____ uv
Receive Sensitivity (____ MHz)	_____ uv	_____ uv
Receive Sensitivity (____ MHz)	_____ uv	_____ uv
PL Deviation	_____ Hz	_____ Hz
DTMF Deviation	_____ KHz	_____ KHz
Audio Deviation	_____ KHz	_____ KHz
Lowest usable Freq @ .5 Pwr	_____ MHz	_____ MHz
Highest usable Freq @ .5 Pwr	_____ MHz	_____ MHz



Radio / Tech Modifications

SCANNER Modifications

Model	Modification	Page #]
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BEARCAT/UNIDEN

BC-200	Expanded RF & Battery Life Extender.....	S-3
BC-205	Expanded RF.....	S-4
BC-700	Expanded RF.....	S-5
BC-760	Expanded RF for older models.....	S-6
BC-760	Expanded RF for newer models.....	S-7
BC-855	Expanded RF for older models.....	S-8
BC-855	Expanded RF for newer models.....	S-9
BC-890	Expanded RF.....	S-10
BC-950	Expanded RF for older models.....	S-11
BC-950	Expanded RF for newer models.....	S-12
BC-2500	Expanded RF.....	S-13
MR-8100	Expanded RF.....	S-15

REGENCY

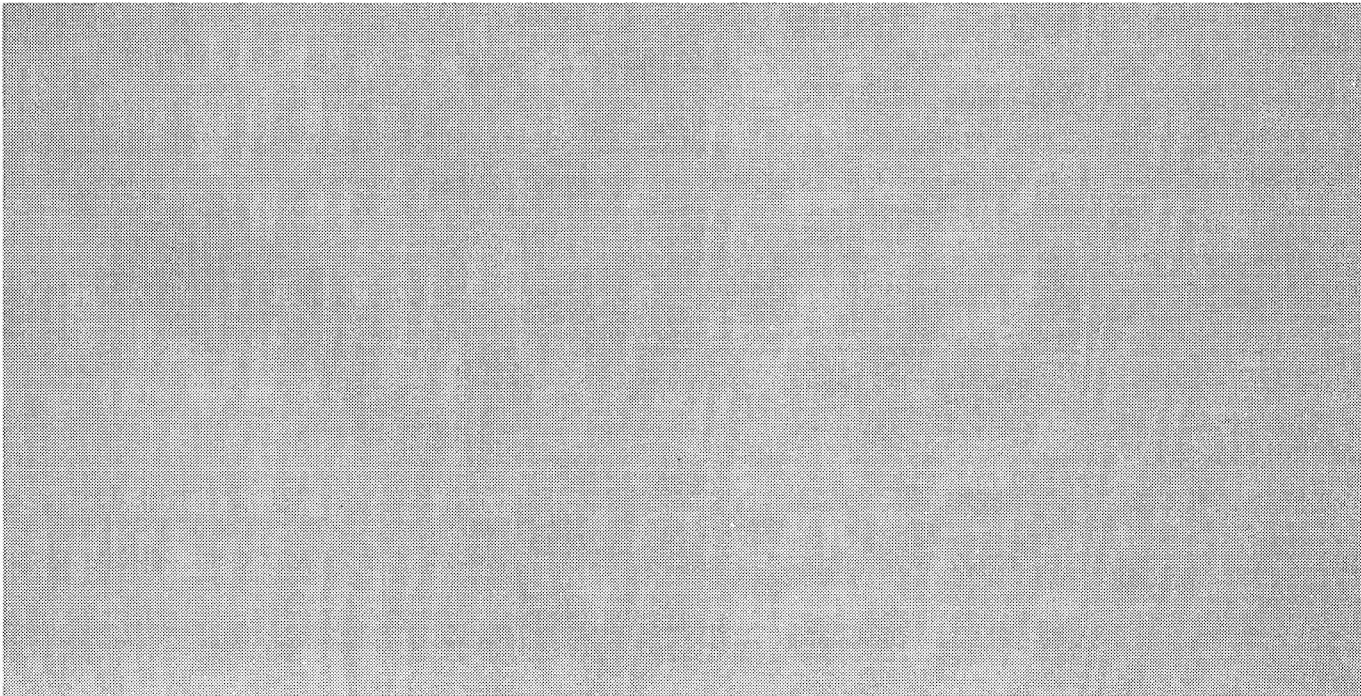
R-4030	Expanded RF & Battery Life Extender.....	S-16
R-1600	Expanded RF for older models.....	S-17
R-1600	Expanded RF for newer models.....	S-18

RADIO SHACK

PRO-23	Expanded RF.....	S-19
PRO-33	Expanded RF.....	S-20
PRO-34	Expanded RF.....	S-21
PRO-37	Expanded RF.....	S-22
PRO-39	Expanded RF.....	S-23
PRO-43	Expanded RF.....	S-24
PRO-46	Expanded RF.....	S-25
PRO-51	Expanded RF.....	S-26
PRO-2004	Expanded RF/More memories/Speed Increase..	S-27
PRO-2005	Expanded RF.....	S-28
PRO-2006	Expanded RF.....	S-29
PRO-2022	Expanded RF.....	S-30
PRO-2026	Expanded RF.....	S-31
PRO-2027	Expanded RF.....	S-32
PRO-2030	Expanded RF.....	S-33
PRO-2032	Expanded RF.....	S-34



Handwritten notes in cursive script, mostly illegible due to blurring. The notes are organized into several paragraphs across the lined section of the page.



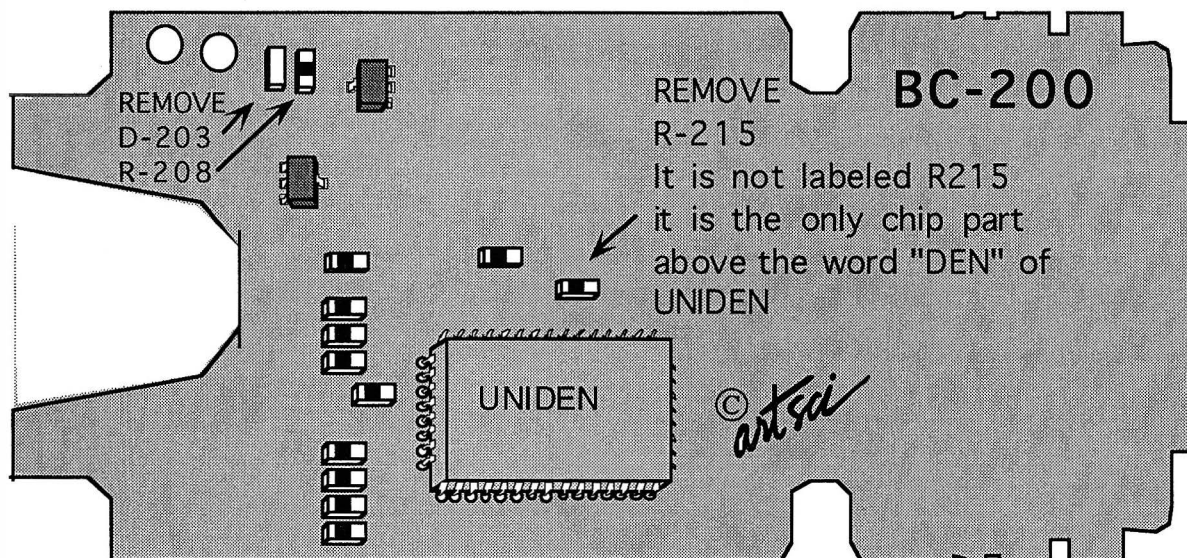
BEARCAT BC-200

EXPANDED RF (800MHz) Extended Battery Life

1. Remove Battery and Antenna.
2. Remove 2 screws from case and 2 from the battery retaining plate and open case.
3. Locate and remove two small screws at the base of the circuit board.
4. Gently pull the front panel from the circuits.
5. Locate and **remove the 10 K resistor R-215** located above the microprocessor (Uniden UC-1147). Note the resistor is above the "den" letters on the microprocessor.
6. Locate and remove the Diode D-203 and Resistor R-208 located by the Speaker. (Battery Mod)
6. Replace the front panel. Keep the holes in the bottom of the case and board lined up and make sure the dual in-line connector is reconnected properly.
7. Reassemble scanner.

If the radio fails to power up, recharge the battery or, the dual in-line connector was not inserted correctly. If the display will not work, make sure that the rows of fine pin are aligned properly with the socket.

Reset Command: Press & Hold [2], [9] & [MANUAL], Turn off and back on.



EARPHONE OUTPUT FIX (Bypass the limiting resistor) - Connect a wire from chassis ground to the earphone ground. Externally- Connect a wire from BNC Jack to Earphone jack.
INTERNALLY - Open the radio & solder a wire from chassis ground to the ground earphone lug.



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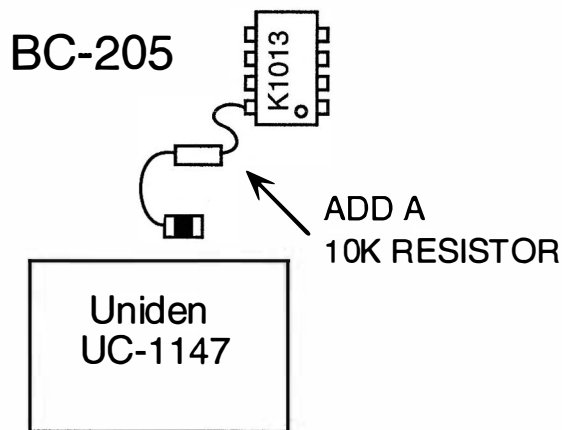
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BEARCAT BC-205

EXPANDED RF (800MHz) Extended Battery Life

1. Remove Battery and Antenna.
2. Remove 2 screws from case and 2 from the battery retaining plate and open case.
3. Locate and remove two small screws at the base of the circuit board.
4. Gently pull the front panel from the circuits.
5. Locate the 10 K resistor located above the microprocessor (Uniden UC-1147). Note the resistor is above the "den" letters on the microprocessor.
6. **Add a 10K Resistor** to from the Chip resistor to Pin 8 of the adjacent K1013 IC.
7. Reassemble the radio.

If the radio fails to power up, recharge the battery or, the dual in-line connector was not inserted correctly. If the display will not work, make sure that the rows of fine pin are aligned properly with the socket.



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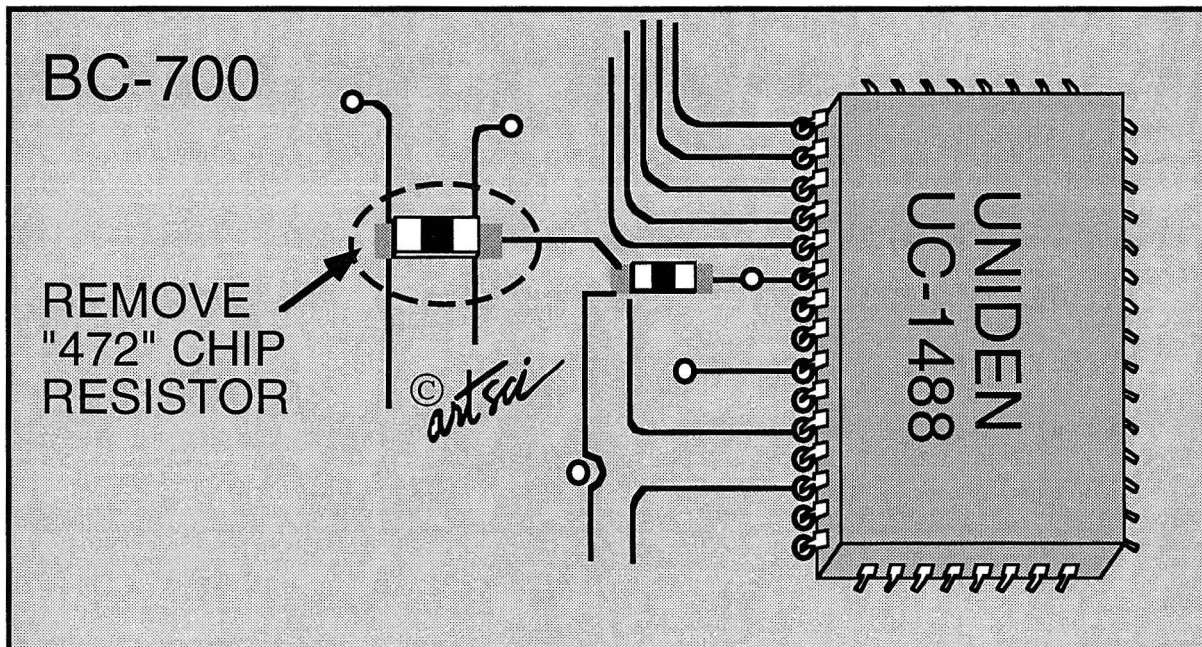
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BEARCAT BC-700

EXPANDED RF (800MHz)
(12.5 kHz spacing)

1. Remove Power and Antenna.
2. Remove the screws from case and separate the two halves.
(Unplug the speaker)
3. Remove two face plate screws (on bottom of face plate)
4. Unplug the cables to tilt the face plate fully forward.
5. Locate and remove the copper/plastic shield under the face plate.
6. Locate and **remove the chip resistor** (labeled "472") as shown.
7. Reassemble the radio.



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BEARCAT BC-760 EARLY MODELS (NO BNC CONNECTOR)

EXPANDED RF (800MHz)

1. Remove Power and Antenna.
2. Remove 4 screws from the bottom case remove the bottom cover.
3. Locate the microprocessor and **clip pin 20**.
4. Reassemble scanner.



Clip Pin 20

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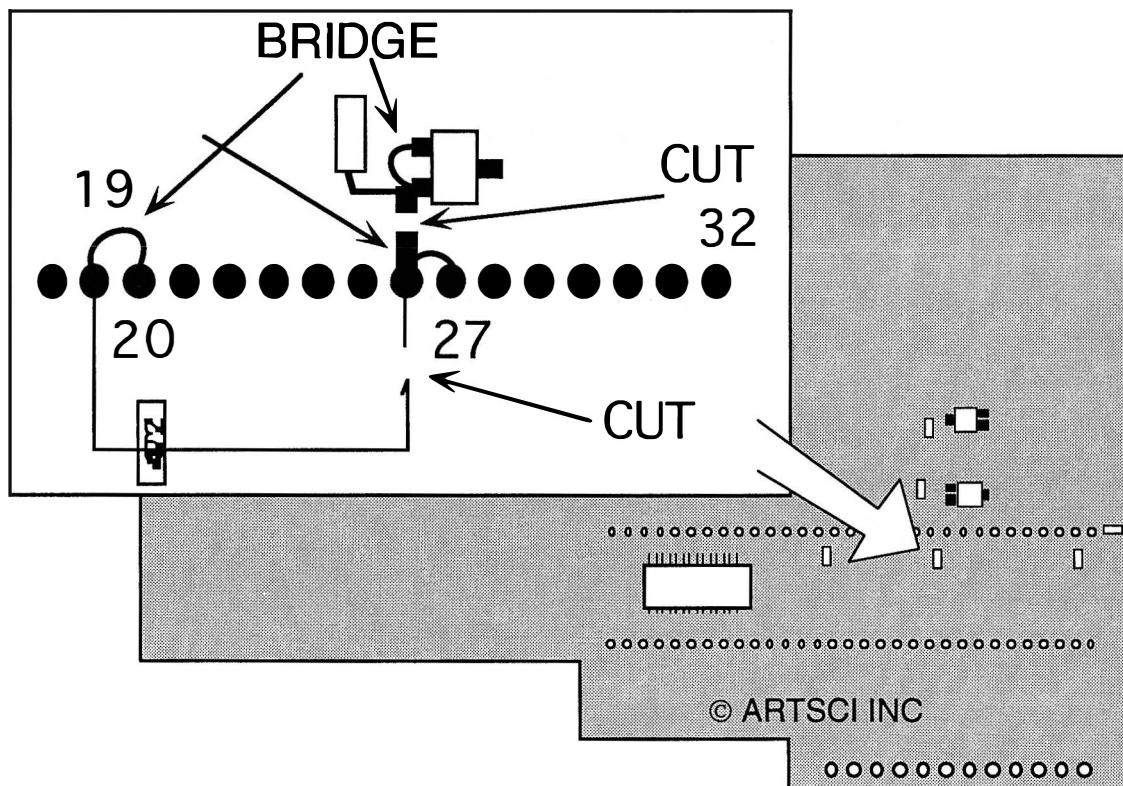


BEARCAT BC-760

LATER MODELS (WITH BNC CONNECTOR)

EXPANDED RF (800MHz)

1. Remove Power and Antenna.
2. Remove 4 screws from the bottom case remove the bottom cover.
3. Locate the SANYO IC. (Identification printed upside down with the front of the radio facing you.
4. Locate the long row of solder pins above the Sanyo IC.
5. Locate Pin 26 of the Microprocessor.
6. **Cut the two traces leading to pin 26.**
7. **Solder bridge Pins 19 & 20 together**
8. **Solder bridge Pins 26 & 27 together.**
9. **Solder bridge the two leads of the chip transistor above pin 27.**
10. Unsolder or cut the 47K Chip Resistor marked "472"
11. Reassemble the radio.



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BEARCAT BC-855XLT

EXPANDED RF (800MHz)

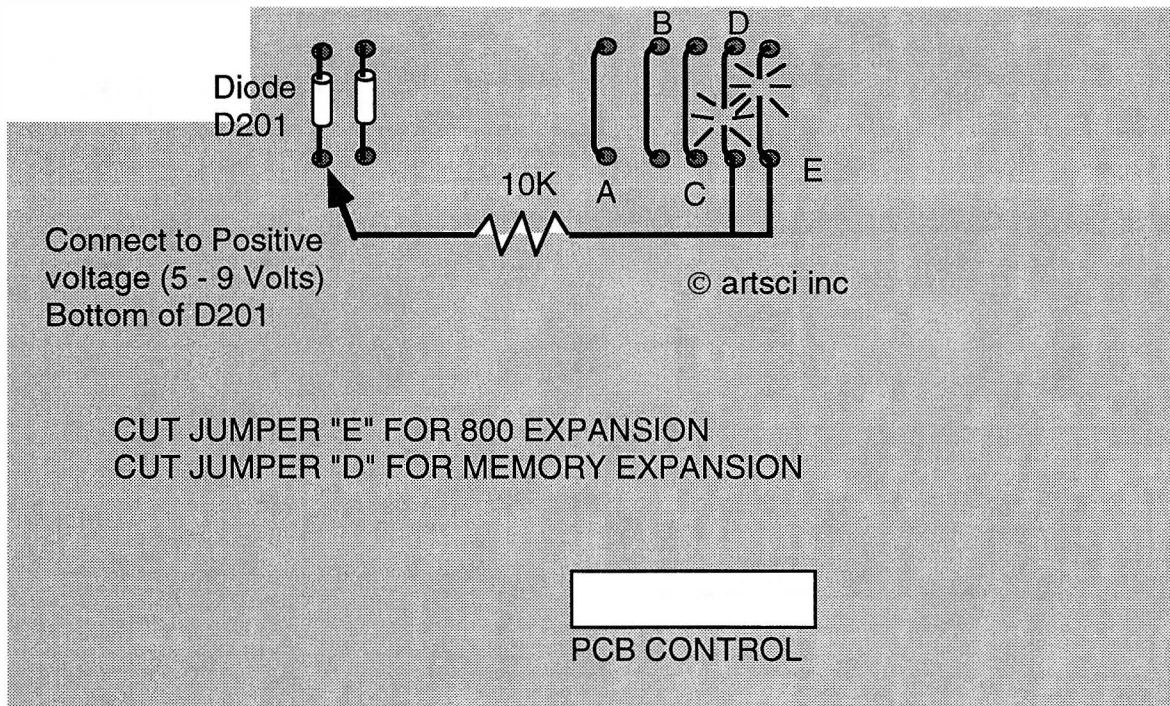
806 - 956 MHz

MEMORY EXPANSION

5 BANKS OF 20 CHANNELS EACH

This mod is for the PH-120AD Model

1. Remove Power and Antenna.
2. Remove screws and open radio.
3. Locate and **CUT jumper "E"** (FOR 800 EXPANSION).
3. Locate and **CUT jumper "D"** (FOR MEMORY EXPANSION).
4. **Solder a 10K resistor from the cut position** . (see drawing)
5. Locate a positive voltage source and attach other end of 10K resistor,
6. Assemble radio.



More

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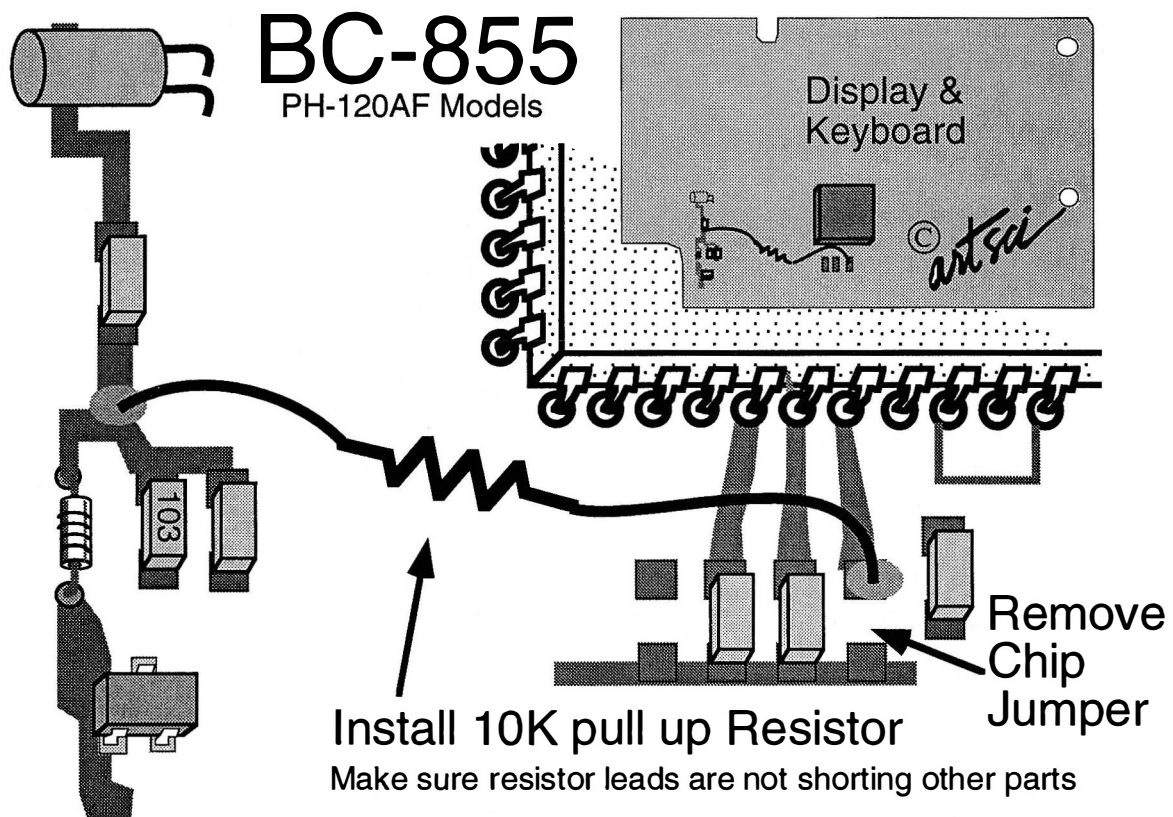
BEARCAT BC-855XLT

EXPANDED RF (800MHz)

806 - 956 MHz

This mod is for the PH-120AF Model

1. Remove Power and Antenna.
2. Remove screws and open radio.
3. Remove screws securing the circuit board to the top panel.
4. Locate and remove chip jumper (see drawing)
5. Solder a 10K pull up resistor from old jumper point to 5 volts (see drawing)
6. Reassemble the radio.



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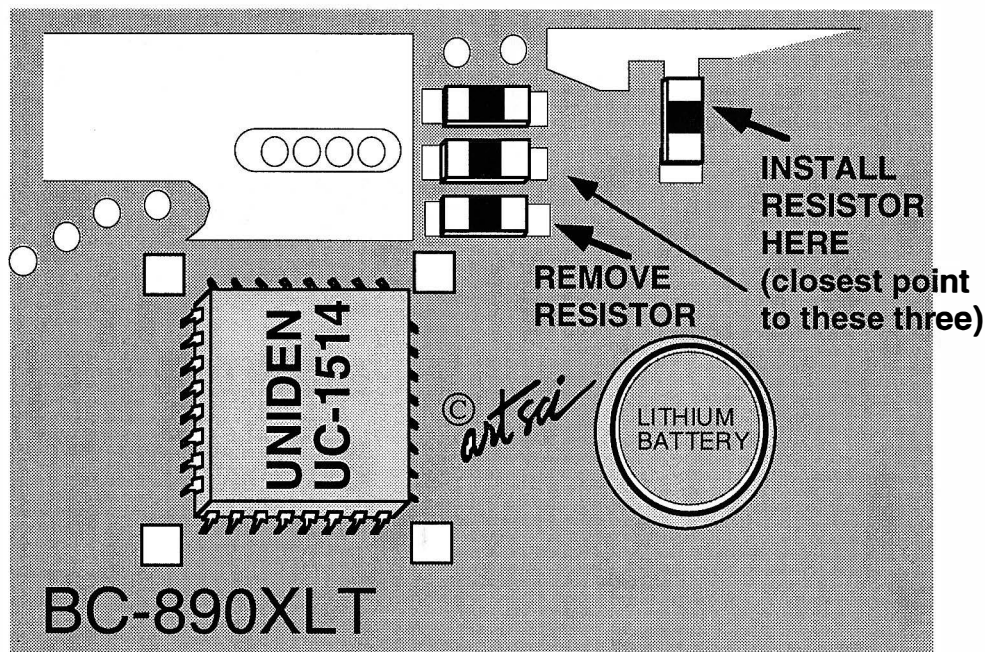
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BEARCAT BC-890XLT

EXPANDED RF (800MHz)

1. Remove Power and Antenna.
2. Remove 10 case screws and open radio. (Unplug the speaker wires)
3. Remove the 4 screws on the front panel and the one bracket screw.
4. Tilt front panel forward.
5. Unplug connectors J4 (white) & J5(blue)
6. Unplug the ribbon connectors J501, J502 & J503.
7. Position Logic board (on face plate) and position board to match picture below.
8. Locate and **remove Chip Resistor** as shown (it is marked "104")
9. **Install the Chip resistor** as shown in drawing.
10. Reassemble the radio.



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BEARCAT BC-950

EARLY MODELS (NO BNC CONNECTOR)

EXPANDED RF (800MHz)

1. Remove Power and Antenna.
2. Remove 4 screws from the bottom case remove the bottom cover.
3. Locate the microprocessor and **clip pin 20**.
4. Reassemble scanner.



Clip Pin 20



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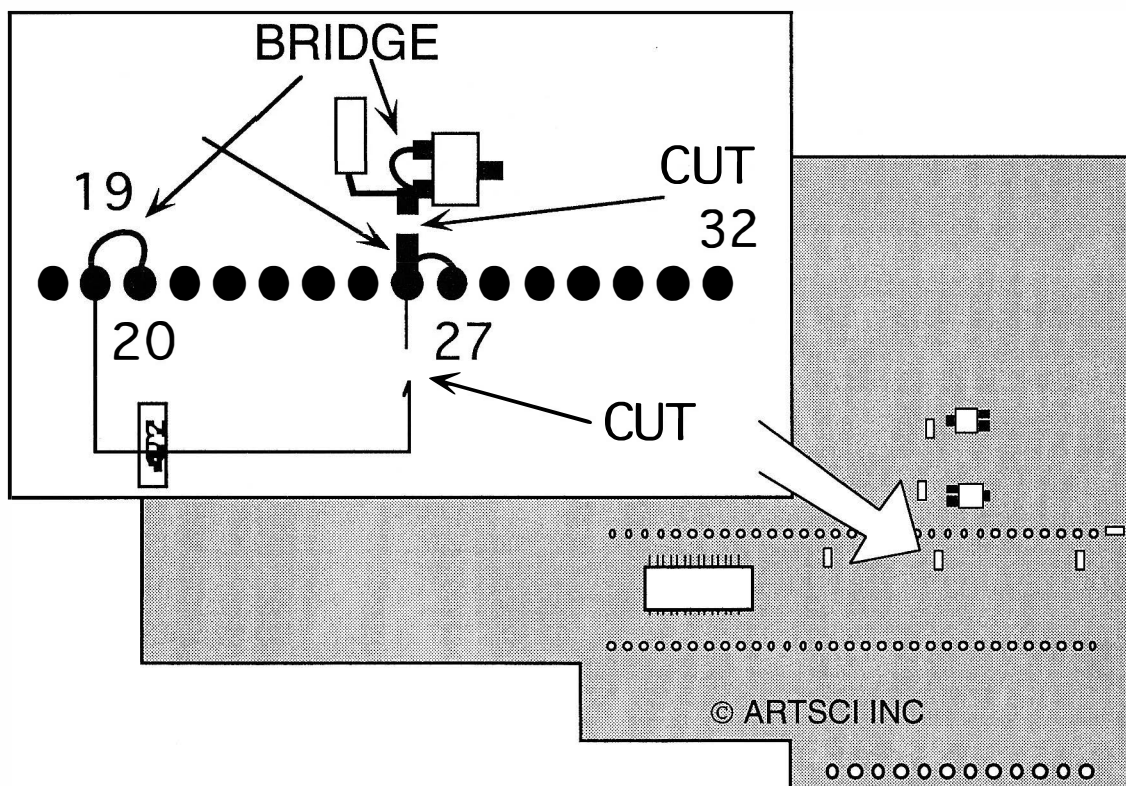
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BEARCAT BC-950XLT

LATER MODELS (WITH BNC CONNECTOR)

EXPANDED RF (800MHz)

1. Remove Power and Antenna.
2. Remove 4 screws from the bottom case remove the bottom cover.
3. Locate the SANYO IC. (Identification printed upside down with the front of the radio facing you.
4. Locate the long row of solder pins above the Sanyo IC.
5. Locate Pin 26 of the Microprocessor.
6. **Cut the two traces leading to pin 26.**
7. Solder bridge Pins 19 & 20 together
8. Solder bridge Pins 26 & 27 together.
9. Solder bridge the two leads of the chip transistor above pin 27.
10. Unsolder or cut the 47K Chip Resistor marked "472"
11. Reassemble the radio.



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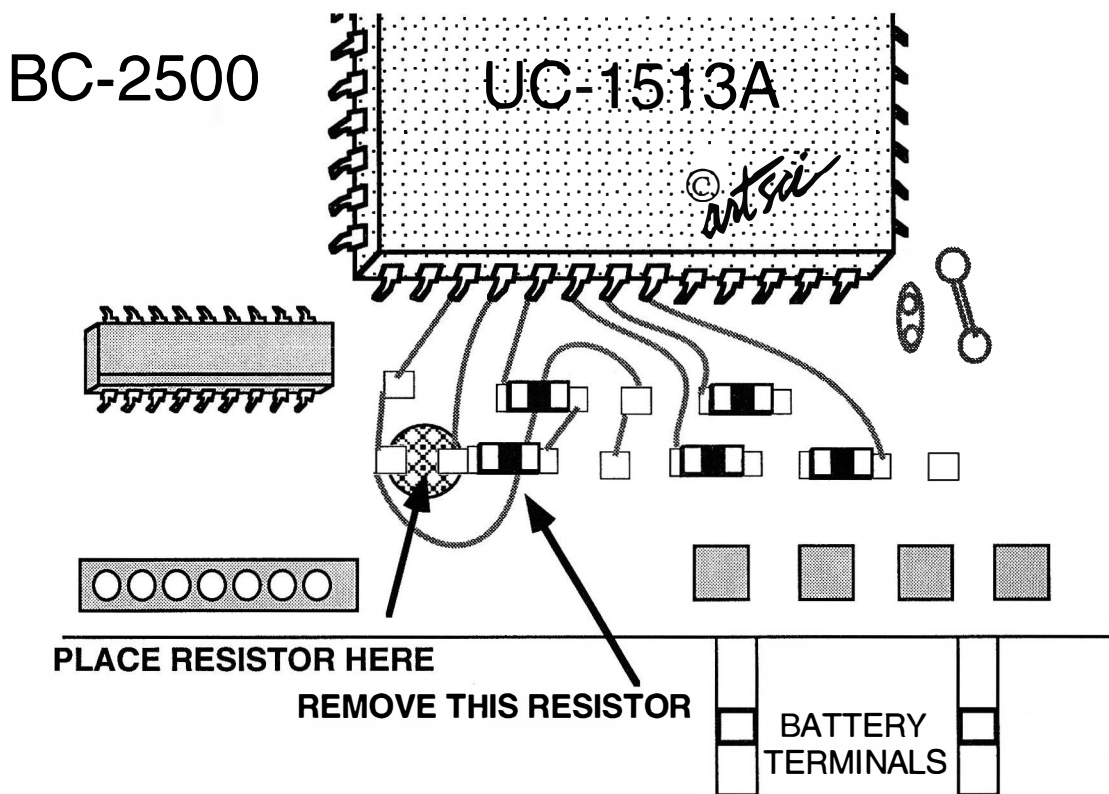
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BEARCAT BC-2500XLT

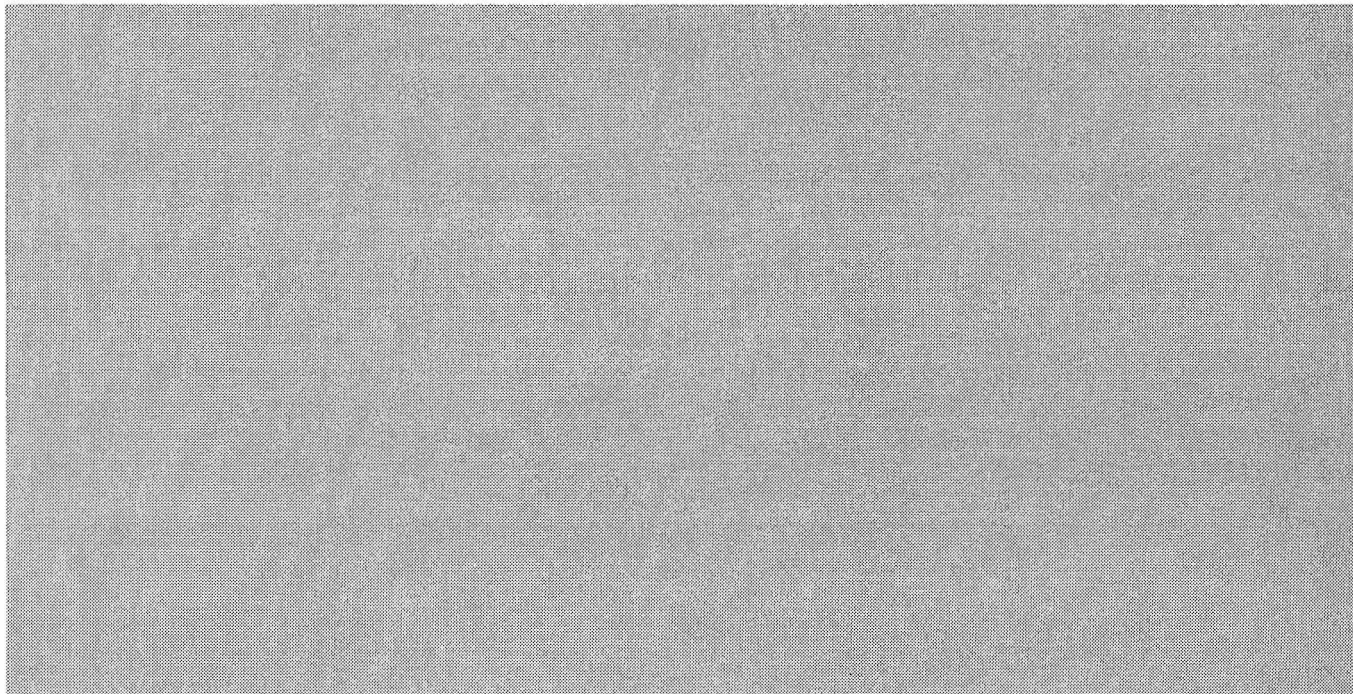
EXPANDED RF (800MHz) 30kHz steps

1. Remove Power and Antenna.
2. Remove the two black screws and the two silver screws from the back cover.
3. Open the radio
4. Locate the circuit board on the front half and unplug it from the front.
(note unplug the board from the 11 pin Molex connector)
5. Locate the microprocessor chip and the chip resistor below it.
6. Locate and **remove the indicated chip resistor and reinstall it as shown.**
7. Reassemble the radio.



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[illegible]

BEARCAT MR-8100

EXPANDED RF (800MHz)

1. Connect radio to the programming computer.
2. Place [CAP LOCK]=OFF & [# LOCK]=OFF.
3. Press [CONTROL] [ALT] [P].
4. Press [CAP LOCK]=ON.
5. Type ECPA1986 [ENTER].
6. Enter expanded frequencies.



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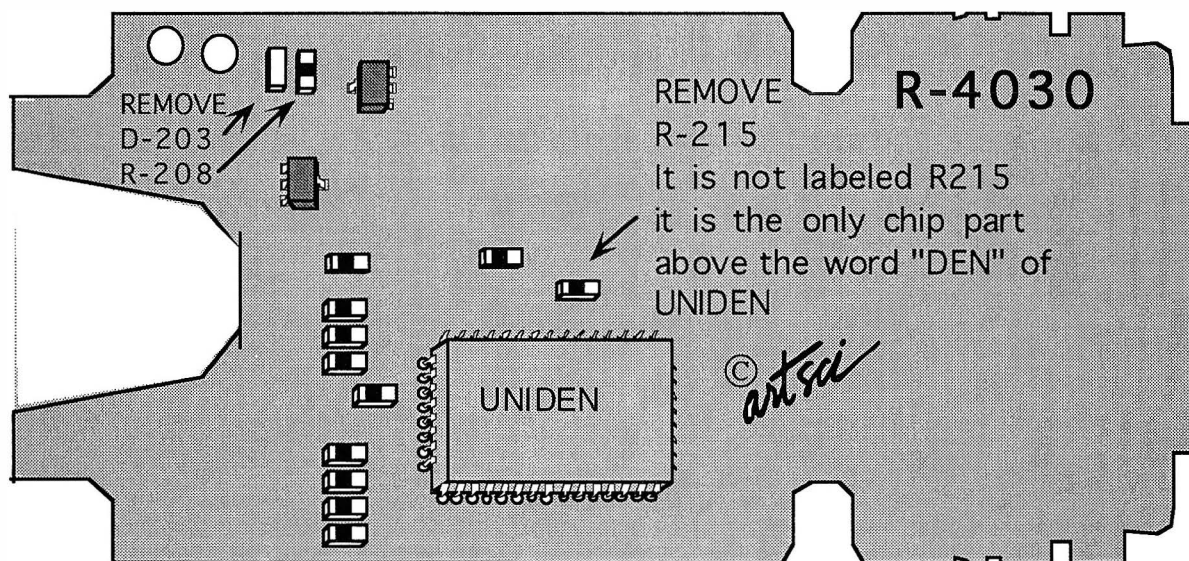
REGENCY R-4030

EXPANDED RF (800MHz)

Extended Battery Life

1. Remove Battery and Antenna.
2. Remove 2 screws from case and 2 from the battery retaining plate and open case.
3. Locate and remove two small screws at the base of the circuit board.
4. Gently pull the front panel from the circuits.
5. Locate and **remove the 10 K resistor R-215** located above the microprocessor (Uniden UC-1147). Note the resistor is above the "den" letters on the microprocessor.
6. Locate and remove the Diode D-203 and Resistor R-208 located by the Speaker. (Battery Mod)
6. Replace the front panel. Keep the holes in the bottom of the case and board lined up and make sure the dual in-line connector is reconnected properly.
7. Reassemble scanner.

If the radio fails to power up, recharge the battery or, the dual in-line connector was not inserted correctly. If the display will not work, make sure that the rows of fine pin are aligned properly with the socket.



EARPHONE OUTPUT FIX (Bypass the limiting resistor) - Connect a wire from chassis ground to the earphone ground. Externally- Connect a wire from BNC Jack to Earphone jack. INTERNALLY - Open the radio & solder a wire from chassis ground to the ground earphone lug.

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REGENCY R-1600 EARLY MODELS (NO BNC CONNECTOR)

EXPANDED RF (800MHz)

1. Remove Power and Antenna.
2. Remove 4 screws from the bottom case remove the bottom cover.
3. Locate the microprocessor and **clip pin 20**.
4. Reassemble scanner.



Clip Pin 20



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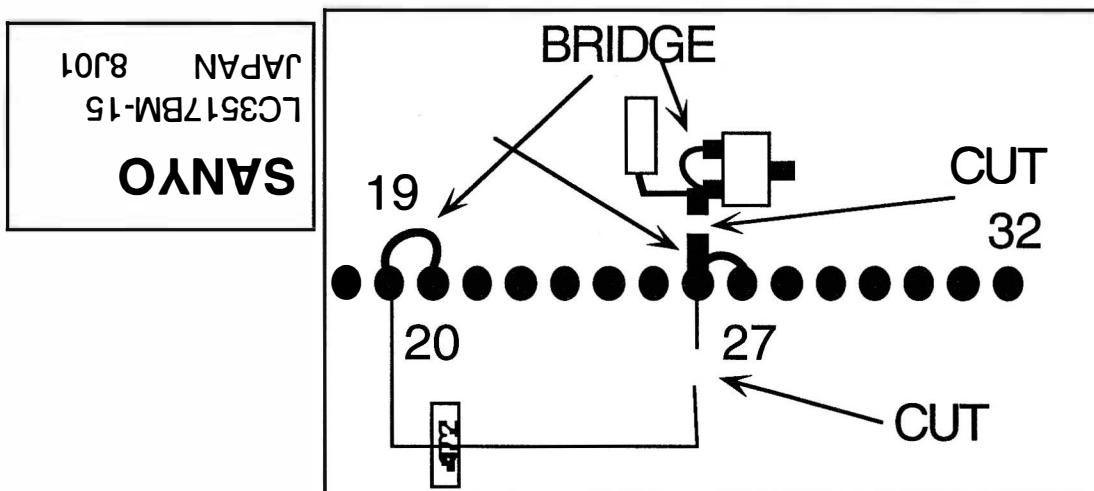
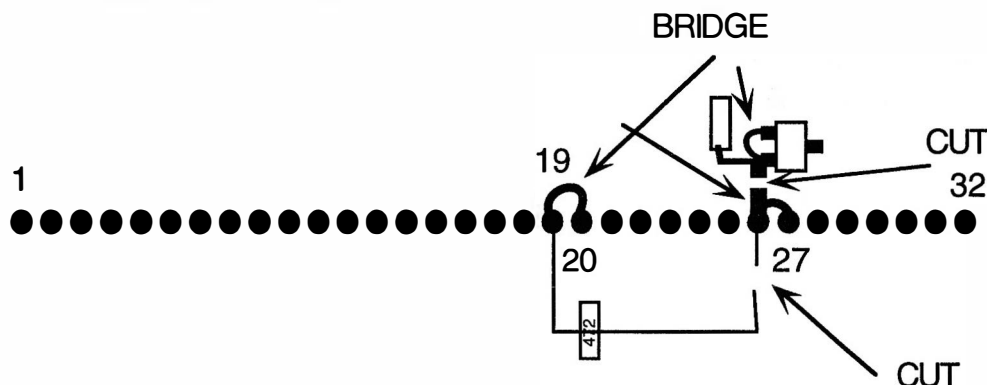
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REGENCY R-1600

LATER MODELS (WITH BNC CONNECTOR)

EXPANDED RF (800MHz)

1. Remove Power and Antenna.
2. Remove 4 screws from the bottom case remove the bottom cover.
3. Locate the SANYO IC. (Identification printed upside down with the front of the radio facing you.
4. Locate the long row of solder pins above the Sanyo IC.
5. Locate Pin 26 of the Microprocessor.
6. **Cut the two traces leading to pin 26.**
7. Solder **bridge** Pins 19 & 20 together
8. Solder **bridge** Pins 26 & 27 together.
9. Solder **bridge** the two leads of the chip transistor above pin 27.
10. Unsolder or **cut** the 47K Chip Resistor marked "472"
11. Reassemble the radio.



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RADIO SHACK PRO-23

800 MHz Expansion
(with 30 kHz steps)

Keyboard only modification!!!

1. Press and hold [2] & [9] & [LOCKOUT] & turn the radio on.
2. Step to channel 15 to display 888.960 MHz (a factory test frequency)
3. Press [UP] or [DOWN] search arrow to scan the band.
You may store up to 10 active frequencies by pressing [MONITOR].

TO STORE A SELECTED FREQUENCY FOR SCANNING (SEARCH STARTING POINT)

1. Step to the Monitor channel you wish to store.
2. Press [PROGRAM] & the desired memory channel number.
3. Press [PROGRAM], [MONITOR] [ENTER].



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RADIO SHACK PRO-33

Scan speed increase

1. Remove Power and Antenna.
2. Remove screws from the case
3. Locate LOGIC circuit board.
4. Locate and **cut Diode D11**
5. Reassemble the radio.

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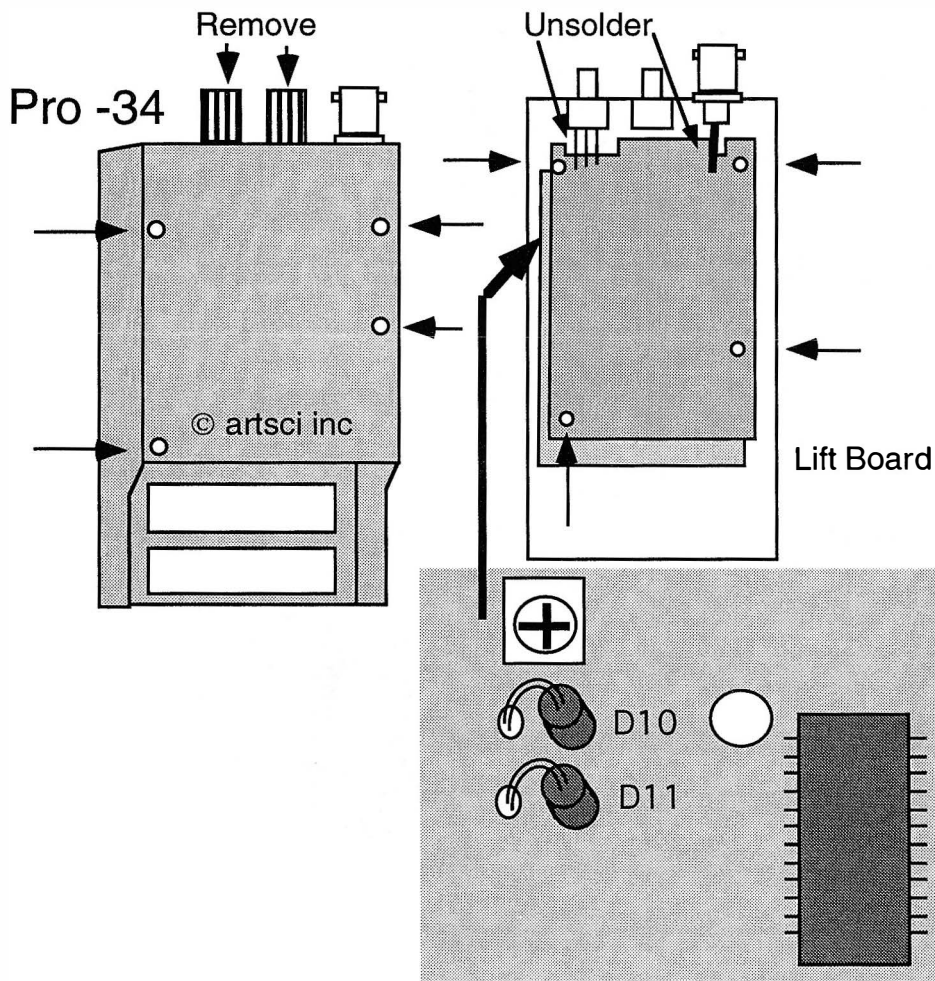
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RADIO SHACK PRO-34

800 MHz Expansion

1. Remove battery and Antenna.
2. Remove 4 screws from the case.
3. Remove Volume and Squelch Knobs.
4. Unsnap and remove back cover.
5. Remove 4 hex screws holding top board.
6. Unsolder the BNC center pin & two wires on volume control.
An additional ground wire on bottom of board to metal shield may need to be removed.
7. Unplug circuit board and move away.
8. Remove 3 screws on metal cover plate and remove.
9. Locate and **cut Diode D11** on Logic board.
5. Reassemble the radio.



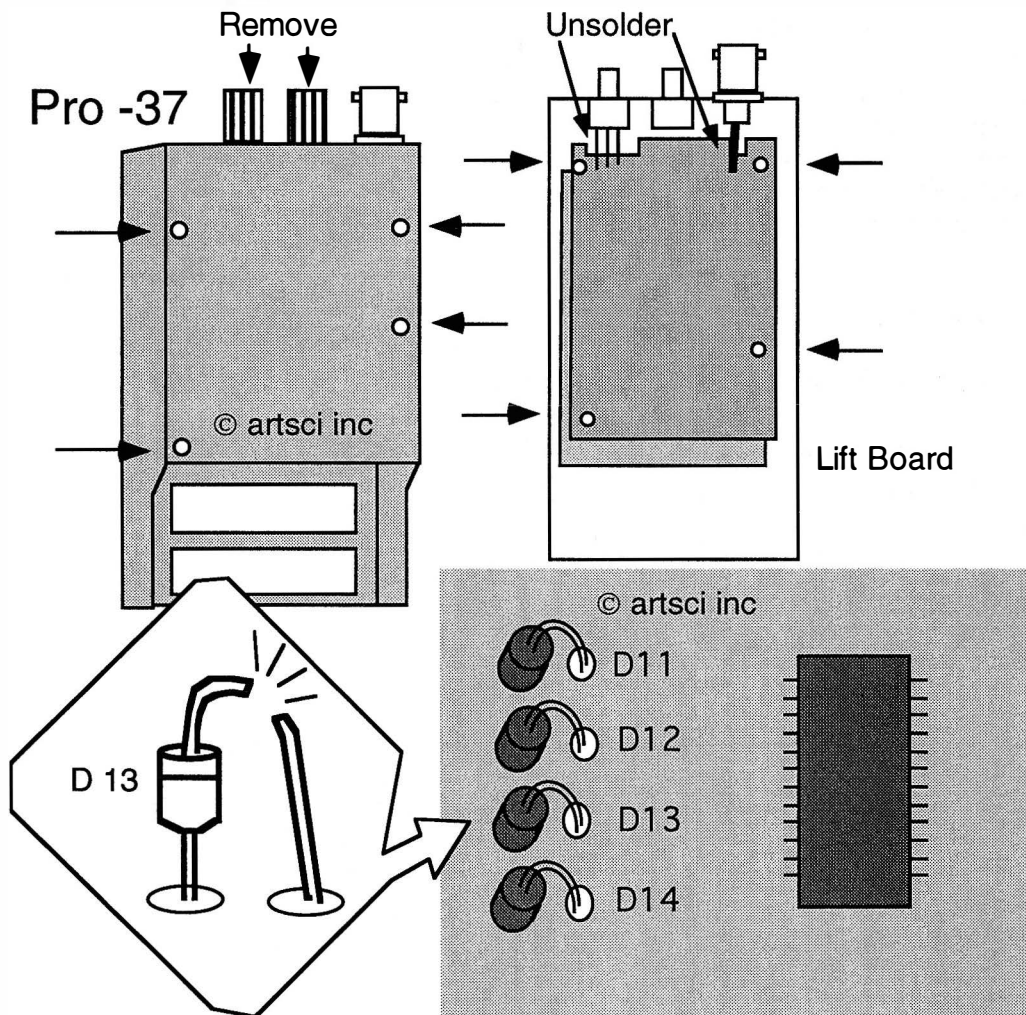
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RADIO SHACK PRO-37

800 MHz Expansion

1. Remove batteries and Antenna.
2. Remove Knobs.
3. Remove the 4 body screws.
4. Slide Case off. (over Vol. & Squelch posts)
5. Unsolder BNC Connector. You may wish to unsolder the 3 wires to the control pot.
6. Unscrew 4" Hex/Nuts Posts" holding upper board.
7. Unplug upper board.
8. Remove 3 shield screws and lift the shield.
9. **Clip Diode D13.**
10. Reassemble the radio.



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RADIO SHACK PRO-39

800 MHz Expansion
30 kHz steps only.

1. Remove batteries and Antenna.
2. Remove 4 screws from the back of the scanner.
3. Carefully lift the scanners back cover off.
4. Unplug the 2 wire harness.
5. Remove the 6 screws holding the circuit board in place.
6. Unsolder the ground wire at the bottom of the board.
7. Unsolder the BNC connector.
8. Lift the board and set it aside.
9. Remove the two screws holding the next circuit board.
10. Unplug the 2 wire connector.
11. Lift the board and set it aside.
12. Unsolder the shield and set it aside.
13. Locate and **remove chip diode D6.**
14. Reassemble the scanner.

OTHER DIODE Modifications (install to enable) :

- D4 - Enable 68-88 MHz coverage (lose 30-54 MHz coverage)
- D5 - Enables 800 MHz operation
- D7 - Enable 12.5 kHz spacing. (Not good for cellular)



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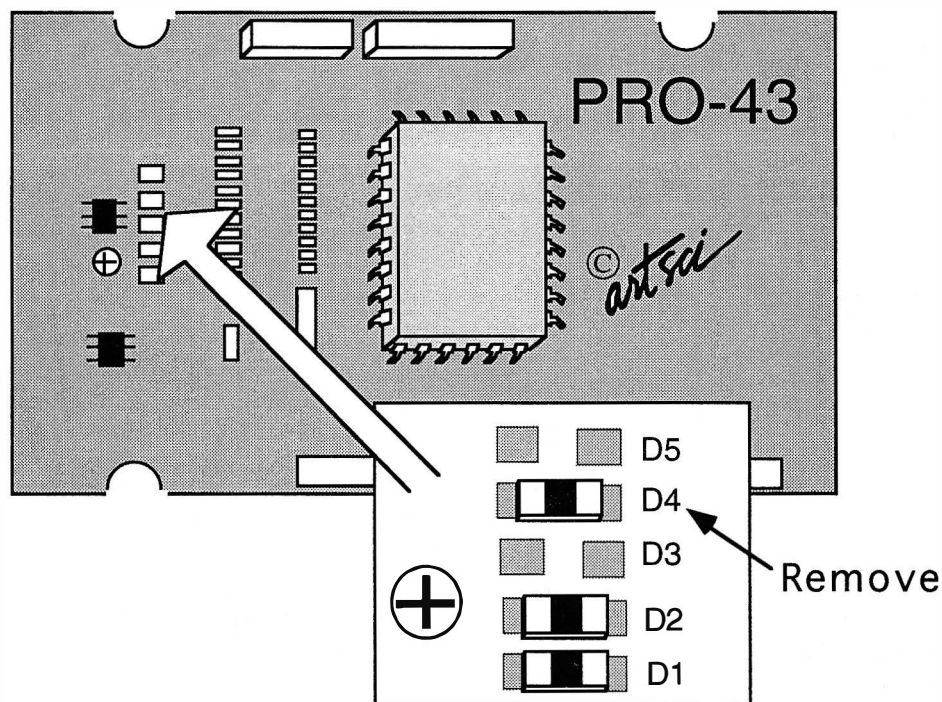
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RADIO SHACK PRO-43

800 MHz Expansion

1. Remove battery and Antenna.
2. Remove the four screws from the back case & gently remove the case.
3. Unsolder the BNC connector from the top board.
4. Remove six screws from the top board.
5. Disconnect the two connectors near the shielded area.
6. Gently lift the top board and set it aside.
7. Remove the two screws securing the middle board.
8. Lift the board and set it aside. (Do not disconnect it from the bottom board.)
9. Unsolder the four corners of the shield and remove it.
10. Locate the surface diodes under the CPU.
11. Locate and **remove D4**. Do not crush the part. Unsolder and remove it.
12. Reassemble the radio.

NOTE: PLACING A DIODE IN POSITION D3 MAY INCREASE LOW BAND COVERAGE FROM 54 TO 88 MHz



Memory clear : Press and Hold [0], [CLEAR] key and turn on

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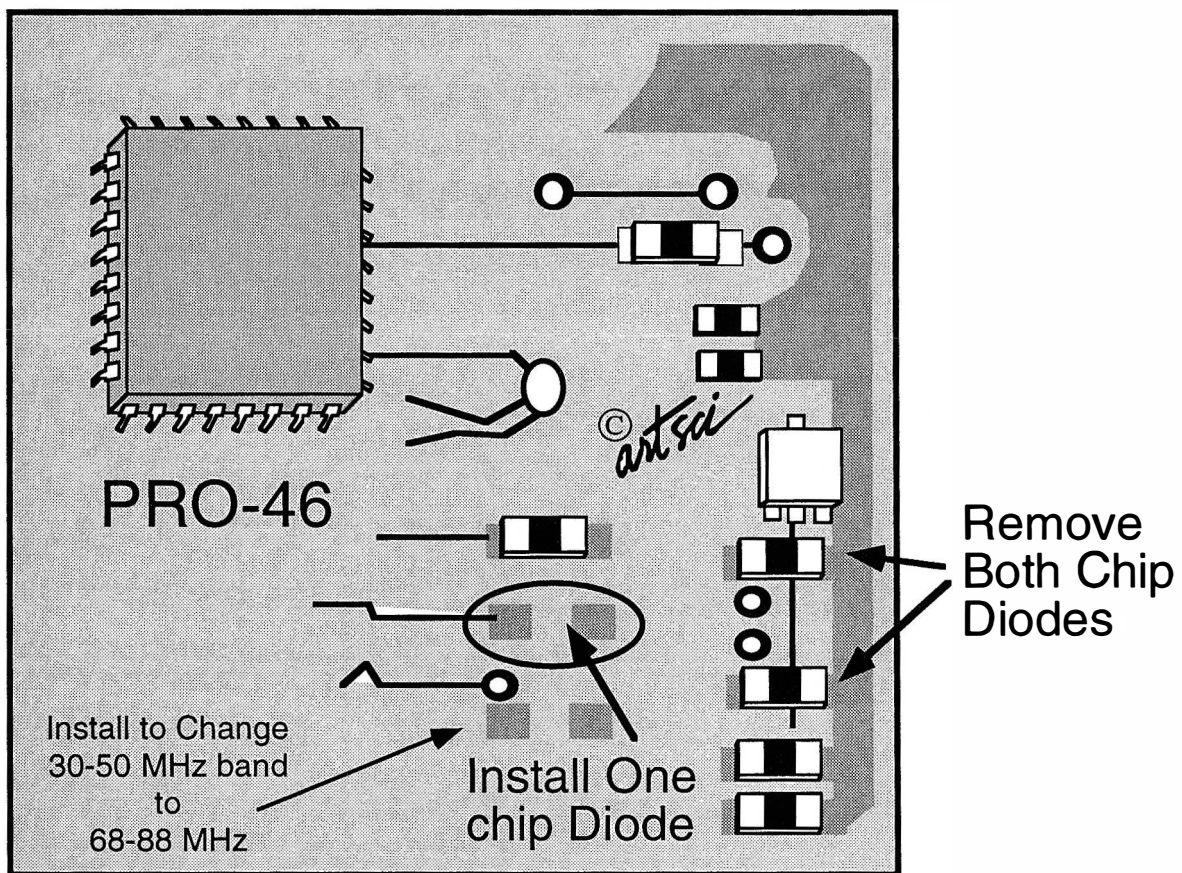
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RADIO SHACK PRO-46

800 MHz Expansion
(with 30 kHz steps)

1. Remove battery and Antenna.
2. Remove the four screws from the back case & gently remove the case.
3. Unplug the upper board from the lower board.
4. Unsolder the copper/Plastic shield from the microprocessor.
5. Locate and **remove the two chip Diodes.** (see drawing)
6. Solder **install one of the chip Diodes** as shown. (upper pad)
7. Reassemble the radio.



Diode Polarity is important. Install the Diode in the same direction as the others on the board.



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RADIO SHACK PRO-51

800 MHz Expansion
(with 30 kHz steps)

Keyboard only modification!!!

1. Press and hold [2] & [9] & [LOCKOUT] & turn the radio on.
2. Step to channel 23 to display 888.960 MHz (a factory test frequency)
3. Press [UP] or [DOWN] search arrow to scan the band.
You may store up to 10 active frequencies by pressing [MONITOR].

TO STORE A SELECTED FREQUENCY FOR SCANNING (SEARCH STARTING POINT)

1. Step to the Monitor channel you wish to store.
2. Press [PROGRAM] & the desired memory channel number.
3. Press [PROGRAM], [MONITOR] [ENTER].

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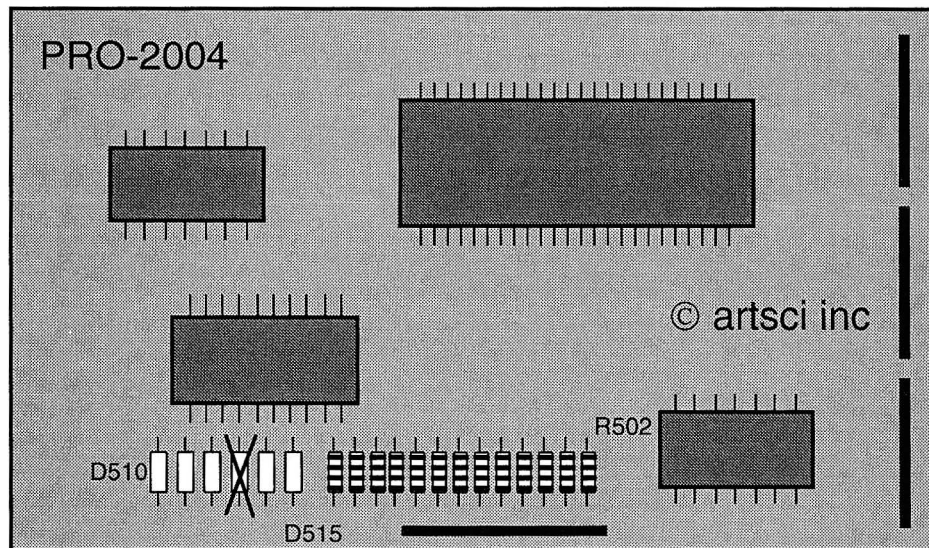
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RADIO SHACK PRO-2004

EXPANDED RF (800MHz)
100 additional Memory Channels

1. Remove Power and Antenna.
2. Remove 4 screws from the case and slide the case off.
3. Locate circuit board PC-3
4. Remove metal cover on top side of PC-3
5. **Cut Diode D-513** (800 MHz Mod)
6. **Add a 1N914 or 1N4148 Diode in position D-510.** (for 400 memories)
 Note: Radio Shack part # 276-1122.
 Note: Diode locations D-510 and D-511 are not labeled
7. Replace metal cover
8. Reassemble radio.



DIODE FUNCTIONS:

- D-510 Add for 400 memories
- D-512 Remove for 12.5 kHz Stepping. (leave in for 30 kHz)
- D-513 Remove for 800 Band Receive.
- D-514 Add to increase scanning speed to 20 Channels per second



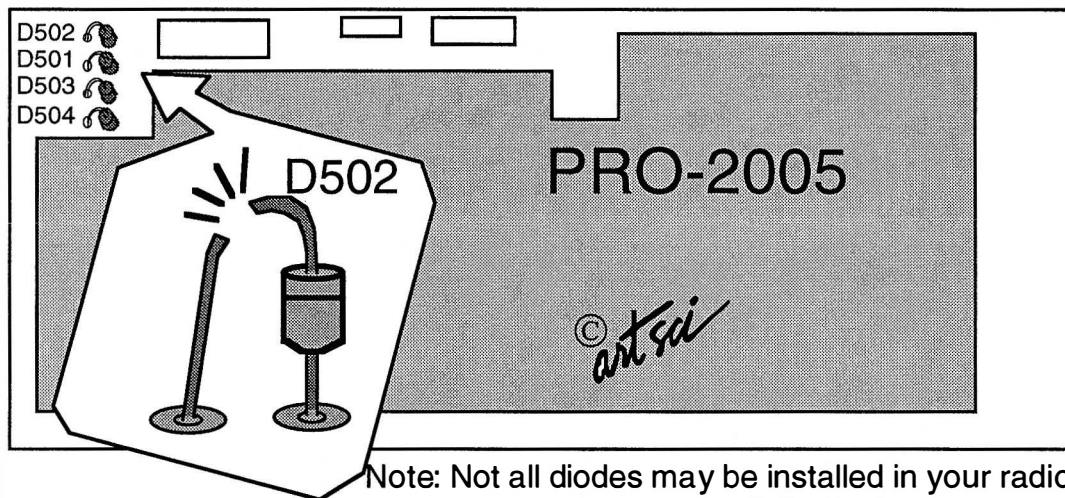
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RADIO SHACK PRO-2005

EXPANDED RF (800MHz)
SCAN SPEED INCREASE.

1. Remove Power and Antenna.
2. Remove 4 screws from the back case.
3. Remove 4 screws on the front panel & unplug the speaker.
4. Locate Diode D502. It is located behind the number 3 key on the keypad.
5. **Cut the exposed lead of D502** and push the ends apart.
6. **Install a Diode in the empty location D-501.** (Speed Increase)
7. Reassemble the radio.



Note: Not all diodes may be installed in your radio.
The above picture shows all diodes for reference only

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RADIO SHACK PRO-2006

EXPANDED RF (800MHz)
SCAN SPEED INCREASE.

1. Remove Power and Antenna.
2. Remove screws from the case
3. Locate Diode D502. It is located behind the number [3] key on the keypad.
4. **Cut the exposed lead of Diode D502** and push the ends apart.
5. **Cut Diode D-503.** (15 Percent speed increase.)
6. Reassemble the radio.



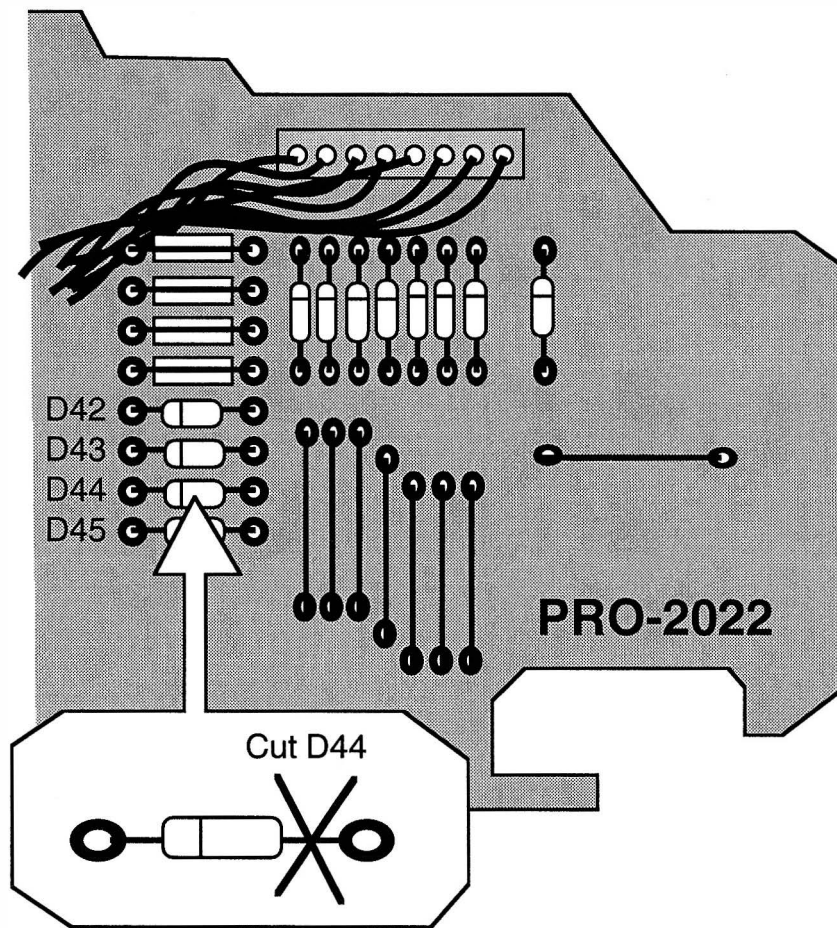
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RADIO SHACK PRO-2022

EXPANDED RF (800MHz)

1. Remove Power and Antenna.
2. Remove screws from the case
3. Locate and **cut Diode D44**.
4. Reassemble the radio.



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RADIO SHACK PRO-2026

EXPANDED RF (800MHz)
(30 kHz Spacing)

1. Remove Power and Antenna.
2. Remove 4 screws from the bottom case.
3. Remove covers.
4. Locate the small circuit board near the lower right-hand corner.
5. Locate and **cut Silver Wire jumper L201.**
6. Reassemble the radio.



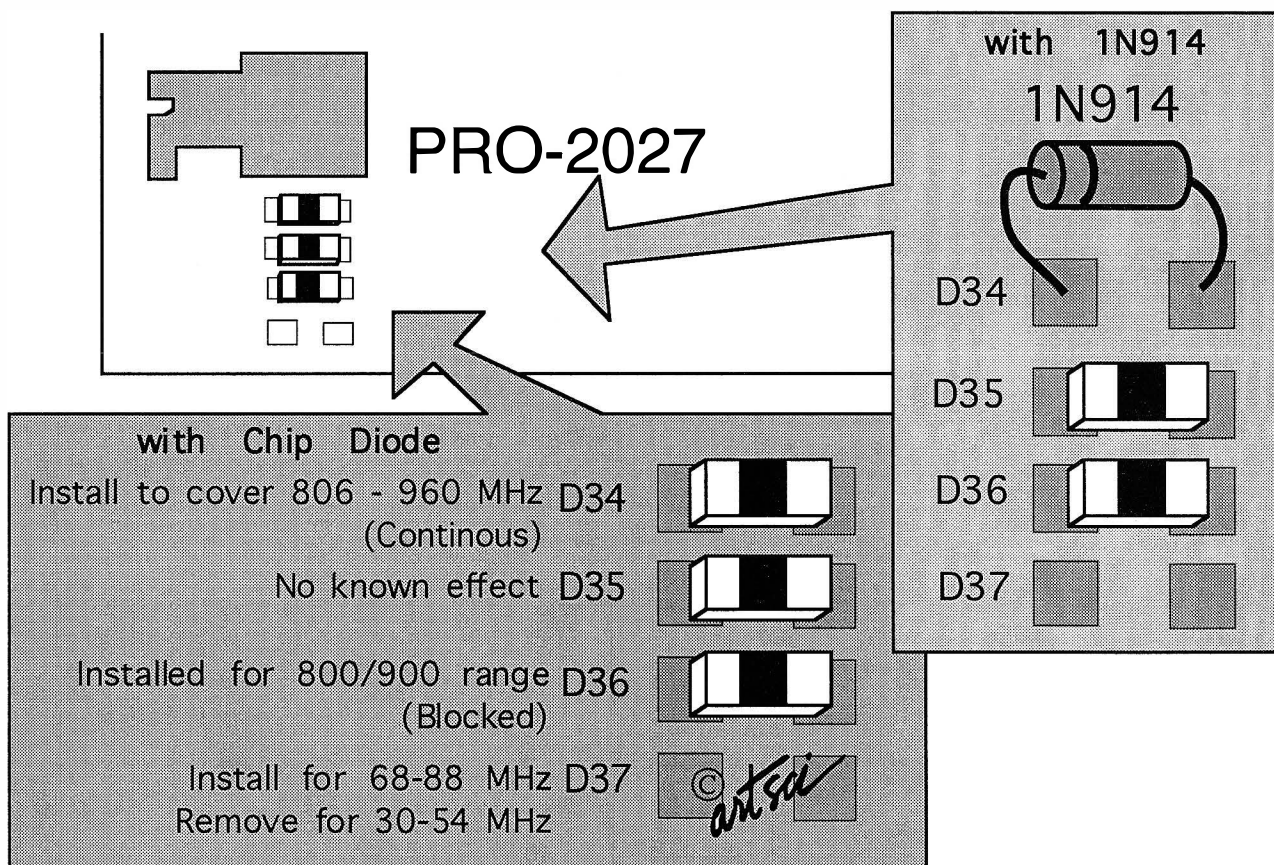
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RADIO SHACK PRO-2027

EXPANDED RF (806-960 MHz)
(12.5 kHz Spacing)

1. Remove Power and Antenna.
2. Remove 4 screws from the bottom and open case.
3. Locate the four diode on the lower left of the CPU board.
4. Solder install a diode in position D34. (same polarity as other diodes)
(a 1N914 may be used) (Some reports say that Diode D35 may be removed and used)
5. Reassemble the radio.



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RADIO SHACK PRO-2030

EXPANDED RF (806-956 MHz)
(30 kHz Spacing)

1. Remove Power and Antenna.
2. Remove screws from the bottom and remove the bottom case.
3. Locate small circuit board in the lower right corner.
4. Locate and **Cut jumper L201**.
5. Reassemble the radio.



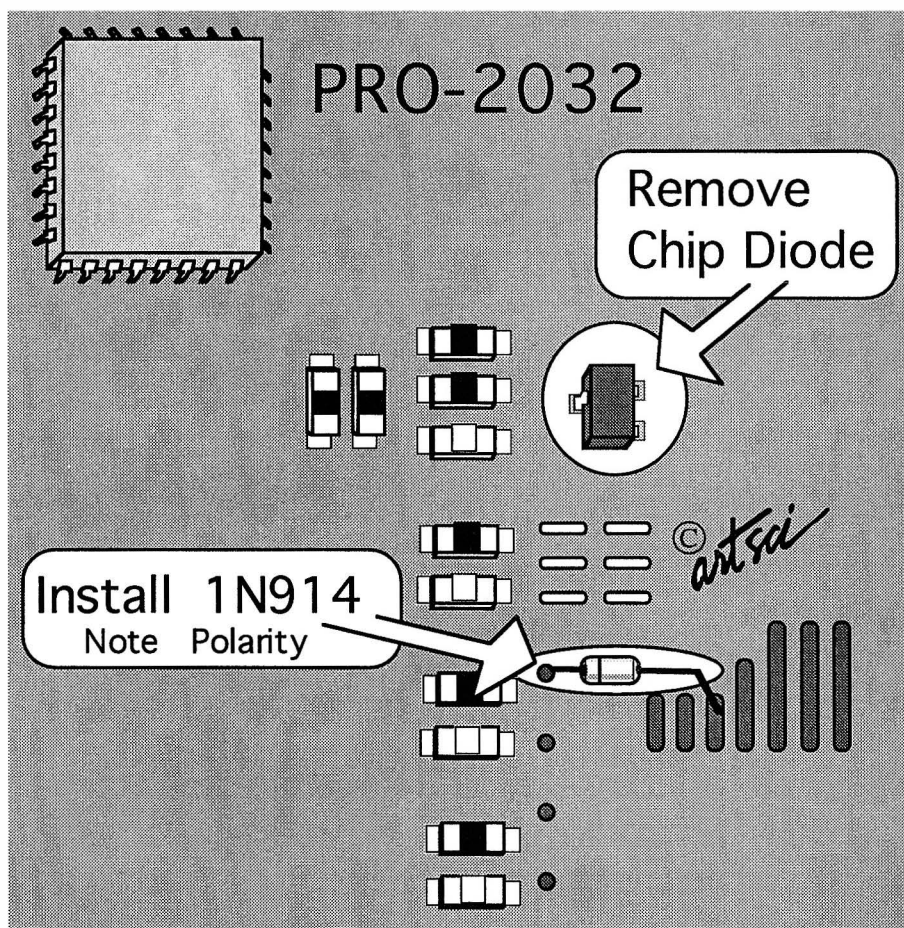
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RADIO SHACK PRO-2032

EXPANDED RF (806-956 MHz)
(30 kHz Spacing)

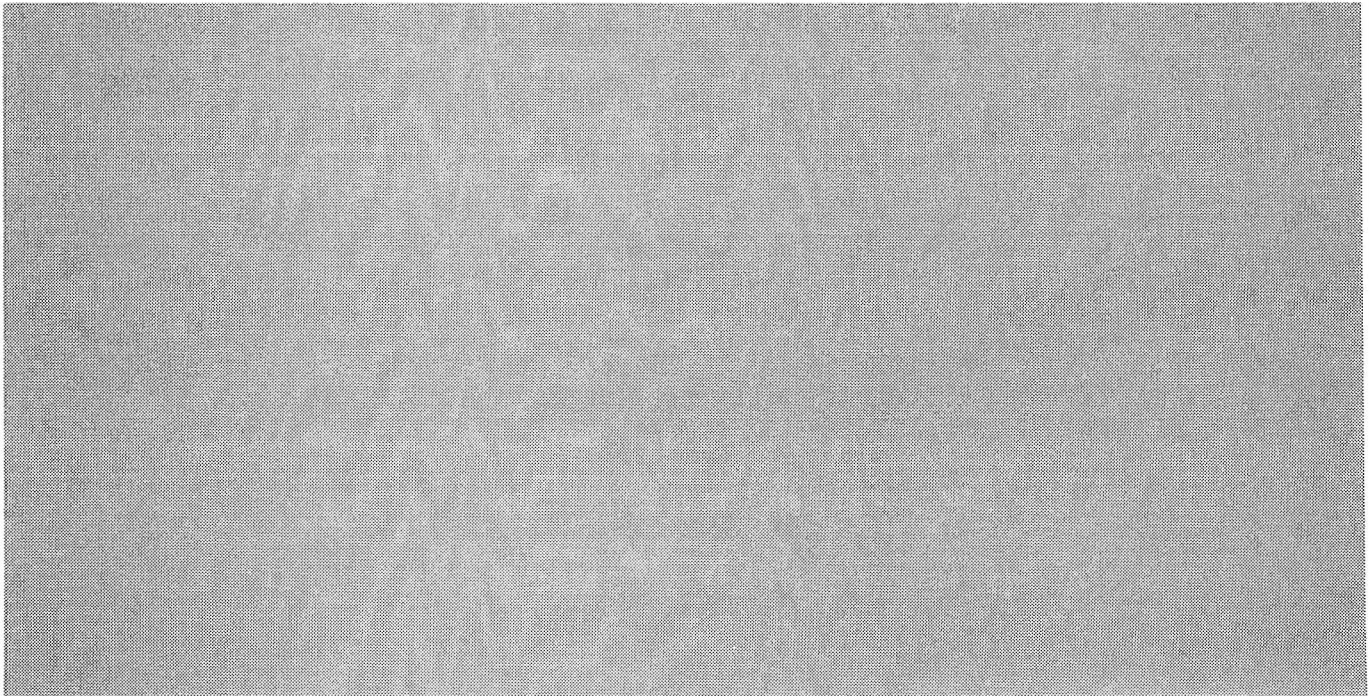
1. Remove Power and Antenna.
2. Remove top and bottom covers. (Watch out for the speaker wires)
3. Locate and remove microprocessor shield. (Near Volume and Squelch Controls)
4. **Locate and remove chip Diode** as shown in drawing.
5. **Install a 1N914 diode** as shown in drawing.
Make sure diode lead do not short or touch any other component.
6. Reassemble the scanner.



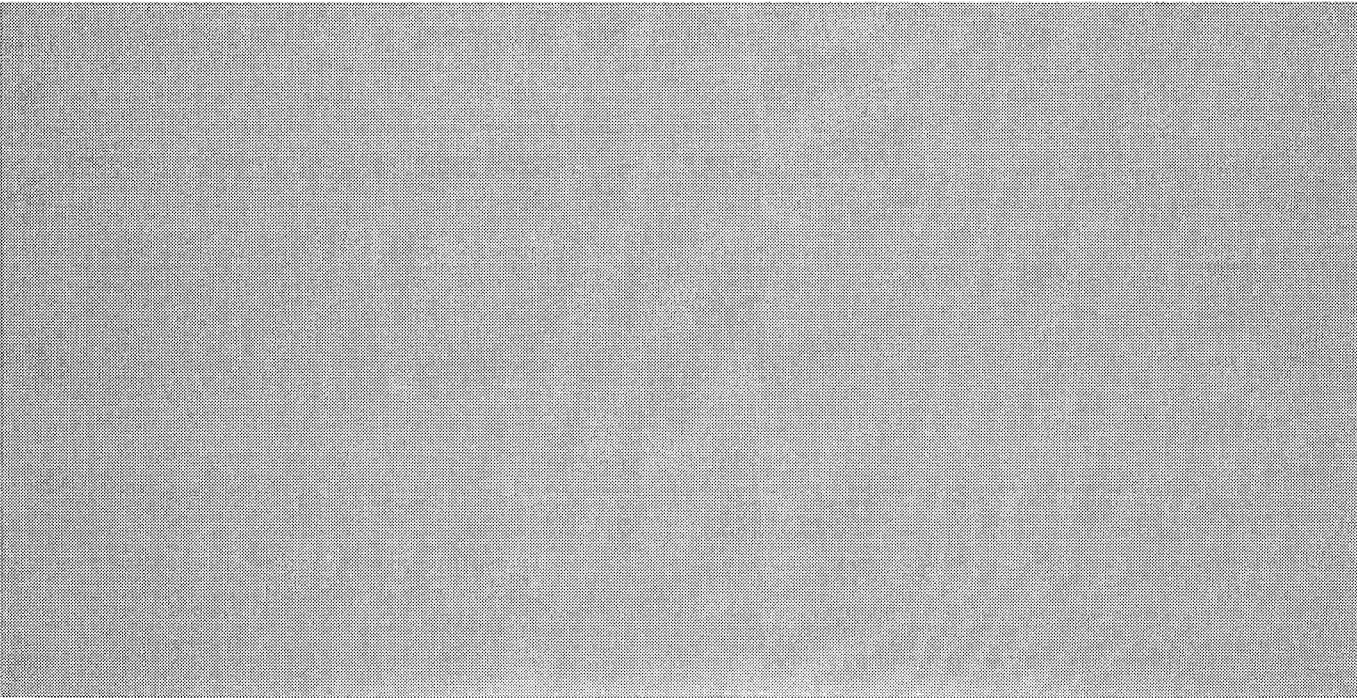
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Burba

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QSL Card Order Form

KB6YZD




DOUG WYNN
P.O. BOX 1848
BURBANK, CA 91507

QSO with	mm/dd/yy	GMT	MHz	MODE	RST
				<input type="checkbox"/> CW <input type="checkbox"/> SSB	

Globe & Shuttle

WA6PQD




STEVE BLUMENFELD
P.O. BOX 1848
BURBANK, CA 91507

QSO with	mm/dd/yy	GMT	MHz	MODE	RST
				<input type="checkbox"/> CW <input type="checkbox"/> SSB	

World Map

N6MQS




AMATEUR RADIO
Bill Smith • P.O. Box 1848 • Burbank, CA 91507

QSO with	DATE	TIME	FREQ	MODE	RST

License Plate

KB6YZD




DOUG WYNN
P.O. BOX 1428
BURBANK, CA 91507

QSO with	mm/dd/yy	UTC	MHz	MODE	RST

Astronaut

KB6SMS

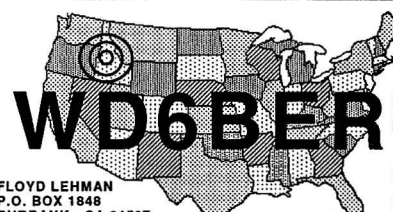


ARNOLD BRATTON
P.O. BOX 1848
BURBANK, CA 91507

QSO with	DATE	TIME	FREQ	MODE	RST

U.S. Map Ham Zones

WD6BER




FLOYD LEHMAN
P.O. BOX 1848
BURBANK, CA 91507

QSO with	DATE	UTC	MHz	MODE	RST

U.S. Map Patchwork

WR6S

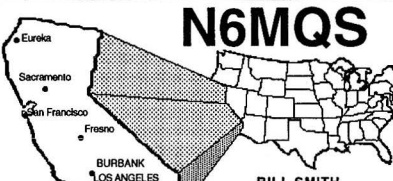


APOLLO 11 "EAGLE ON THE MOON"
PAT JASPER
P.O. BOX 1848
BURBANK, CA 91507

QSO with	DATE	TIME	FREQ	MODE	RST

Eagle on the moon

N6MQS




BILL SMITH
P.O. BOX 1848
BURBANK, CA 91507

QSO with	DATE	GMT	MHz	MODE	RST

California/U.S. (CAL ONLY)

SWL



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P.O. BOX 1848
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Station	mm/dd/yy	U.T.C.	Frequency

Globe (Short Wave Listener)

Call Sign _____ or "SWL"

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Phone # (____) _____ - _____

☐ Put Phone # on QSL Card

☐ Put Phone # on Eyeball (small) Card

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QSL Card Style (Choose one)

- ☐ U.S. Map Patchwork
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- ☐ World Map dots
- ☐ World Map
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- ☐ Astronaut
- ☐ Eagle on the moon
- ☐ Globe & Shuttle
- ☐ Globe (SWL)

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TAX 8.25%

Shipping \$ 4.00

Total Due

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Guide Freq. & Ref

Amateur
Reference

Radio Reference

TITLE	DESCRIPTION	PRICE	QTY	EXTENSION
Radio/Tech Modifications VOL 7A	Over 200 pages of mods for ICOM, KENWOOD Radios & all models of Scanners	19.95		
Radio/Tech Modifications VOL 7B	Over 200 pages of mods for ALINCO, YAESU, STANDARD and all models of CB equipment.	19.95		
Lost Users Manuals	Operating Instructions for all popular amateur Mobiles & Ht's.	19.95		
U.S. Repeater Mapbook	VHF & UHF Repeater guide for the USA with State Maps showing popular repeaters.	9.95		
Amateur HamBook #2	Construction plans, coax, antenna, connector, SWR charts. A must have.	14.95		
Ham Radio Resource Guide	For Southern California only. Testing, Club, Repeater, maps & more	9.95		
Federal Assignments Volume #4	Scanner Frequency guide for all Federal Government Agencies. Over 300 pages	24.95		
Police & Fire Communications Handbook	For Southern & Central California Scanner Listners. Best available freq. List !!	19.95		
North American Shortwave Directory	Complete Listing of all activity on the HF band 0-30MHz.	19.95		
Riding the airwaves with Alpha & Zulu	Novice & No-code license test book using cartoon strips to teach. for ages 8 - 80 !!!	14.95		

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ADDRESS		
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PHONE ()		

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Give us your phone number in case we have a problem processing your order.

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CARD #

EXP DATE

artsci

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mail to:

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Phone Support

— Proof of Purchase —

Radio/Tech Modifications

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ADDRESS _____

CITY _____ ST _____ ZIP _____

PHONE () - _____
Optional

Date Purchased _____

Purchased from _____

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☐ Please send any additional material that becomes available.

☐ Please DO NOT send any mailings.

☐ I want the next version of this book when it becomes available in November 1995. Ship it to me and charge my card at that time.

Visa # _____ exp. _____

Modifications for:

Kenwood

TH-21A	∞•	TM-711	∞
TH-22A	∞	TM-721	∞•
TH-25A	∞•	TM-731	∞•
TH-26A	∞•	TM-732	∞•
TH-27A	∞•	TM-733A	∞
TH-28A	∞•	TM-741	∞
TH-31A/BT	•	TM-742	∞
TH-41A/BT	•	TM-941	
TH-42AT	∞	TM-942	∞
TH-45A	∞•	TM-2530	∞•
TH-48A	∞•	TM-2550	∞•
TH-55A	•	TM-2570	∞•
TH-75A	∞	TR-751	∞•
TH-77A	∞	TR-2500	∞
TH-78A	∞•	TR-2600	∞
TH-79A	∞	TS-50	∞
TH-215	∞•	TS-140S	∞
TH-315	∞•	TS-430S	∞
TM-221	∞•	TS-440S	∞
TM-231A	∞•	TS-450S	∞
TM-241A	∞•	TS-680	∞
TM-251A	∞	TS-690S	∞
TM-321	•	TS-711	∞
TM-331	∞•	TS-790A	∞
TM-421	∞•	TS-850S	∞
TM-431A	∞•	TS-930S	∞
TM-441A	∞•	TS-940	∞
TM-621	∞•	TS-950SD	∞
TM-631	∞•	TS-2400	∞
TM-641	∞•	TW-4100	
TM-701A	∞•	TM SERIES	

- ∞ Frequency Expansion
- Alignment controls

ICOM

IC-02AT	∞	IC-820	∞
IC-2A/AT	•	IC-900	∞•
IC-2iA	∞	IC-901A	∞
IC-2GAT	∞•	IC-970	∞
IC-2GXAT	∞	IC-1200	∞
IC-2SA	∞•	IC-2330	∞
IC-2SAT	∞•	IC-2340	∞
IC-2SRA	∞•	IC-2400	∞•
IC-3SAT	∞•	IC-2410	∞
IC-04AT	∞	IC-2500	∞•
IC-4GAT	∞•	IC-2700	∞
IC-4SAT	∞•	IC-3200	∞•
IC-4SRA	∞•	IC-3210	∞•
IC-12AT	∞	IC-3220	∞•
IC-12GAT	•	IC-2230	∞
IC-24	∞•	IC-H16	∞
IC-25	∞•	IC-M600	∞
IC-27A/H	•	IC-M800	∞
IC-28A/H	∞	IC-P2AT	∞•
IC-32AT	∞	IC-P4AT	∞•
IC-38	∞	IC-R71	∞
IC-48	∞	IC-R7000	∞
IC-228	∞•	IC-RP1220	
IC-229	∞•	IC-RP1520	
IC-281	∞	IC-RP4020	
IC-290	∞	IC-RP4520	
IC-448	∞•	IC-S21	∞
IC-449	∞•	IC-S41	∞
IC-575	∞	IC-T21	∞
IC-707	∞	IC-T21	∞
IC-720	∞	IC-DELTA1	∞
IC-725	∞	IC-DELTA 100	∞
IC-726	∞	IC-U2AT	∞•
IC-729	∞	IC-U4AT	∞•
IC-730	∞	IC-U16	∞
IC-735	∞	IC-V21 AT	∞•
IC-736	∞	IC-W2A	∞•
IC-737	∞	IC-W21A	∞
IC-738	∞	IC-W21AT	∞
IC-740	∞	IC-X2A	∞•
IC-745	∞	IC-X21AT	∞
IC-751	∞	IC HT'S TO TNC	
IC-761	∞		
IC-765	∞		
IC-781	∞		

Scanners

Uniden Bearcat

BC-200	∞
BC-205	∞
BC-700	∞
BC-760	∞
BC-855	∞
BC-890	∞
BC-950	∞
BC-2500	∞
MR-8100	∞

Regency

R-4030	∞
R-1600	∞
R-1600	∞

Radio Shack

PRO-23	∞
PRO-33	∞
PRO-34	∞
PRO-37	∞
PRO-39	∞
PRO-43	∞
PRO-46	∞
PRO-51	∞
PRO-2004	∞
PRO-2005	∞
PRO-2006	∞
PRO-2022	∞
PRO-2026	∞
PRO-2027	∞
PRO-2030	∞
PRO-2032	∞

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